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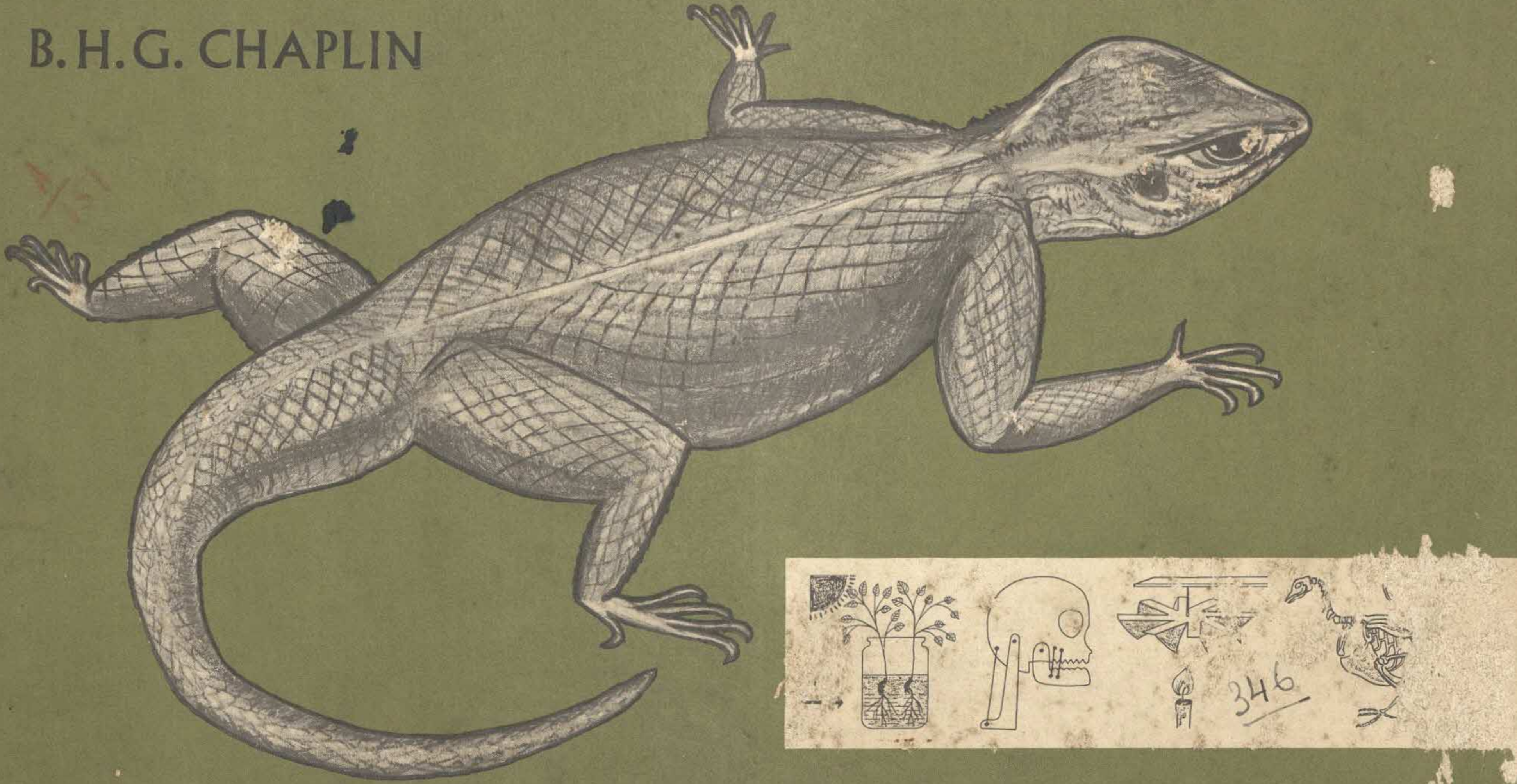
Life and Living 2

B. H. G. CHAPLIN



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For pupils in Tropical Pre-secondary Schools — A Practical and Pictorial Course in Nature Study

Notes to Pupils

This book has been written to help you see properly and understand the very wonderful world around us.

It is a 'doing' book, full of experiments for you to do, things to make and things to collect.

Your teacher will explain all these things to you, but you will have to make sure that, whatever happens, you bring all the things you need to school, so that everybody can get the greatest pleasure out of the lessons.

None of the drawings or pictures in this book are for you to copy. They are there to help you to understand and draw things you really see for yourself. They are *not* to be *copied* into your exercise books at all.

Illustrations by Valerie Herbst

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Life and Living 2

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SMALL THINGS WITH JOINTED LEGS

Catching Insects

These pictures show you how to catch and keep insects. All these things can be made by one pupil or in groups.

Bring the things you need the week before.

1, 2, 3, 4, 5 and 6 show a trap for cockroaches. This should be put on the floor or in a cupboard *a day or two before you need the insects.* Some food should be put inside the jar.

7 is for catching Fruit Flies. 8 and 9 is the same jar with a piece of white paper where you can see the eggs change into the flies.

The hardest thing for you to make is the glass box for ants. *Here you will need the help of your teacher to get the glass cut to the right size.* It is best to get the two pieces of glass first and fit the pieces of wood to them later.

13, 14 and 15 show the way of keeping Orb Spiders so they can make their webs.

When you have caught your insects, watch them feed, lay eggs, and change from egg to insect. Draw them doing all these things. Write what you have found out about their food and habits, where they like to live, their size, colours, shape, and ways of moving.

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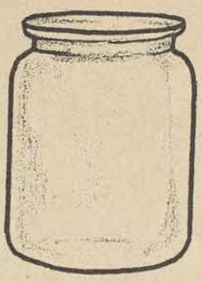
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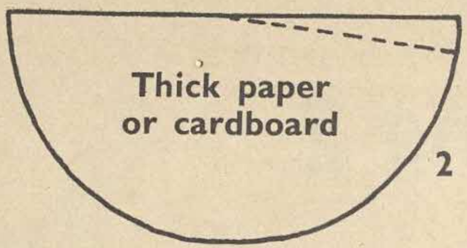

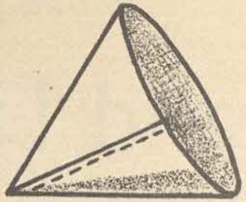
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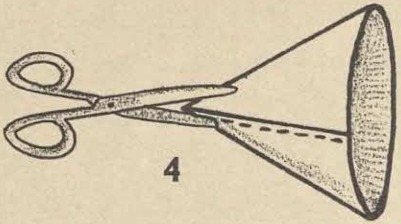
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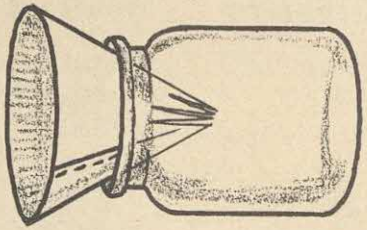
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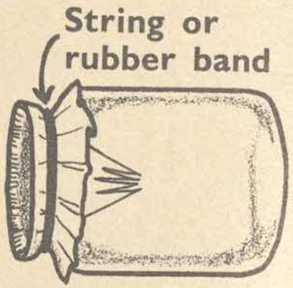

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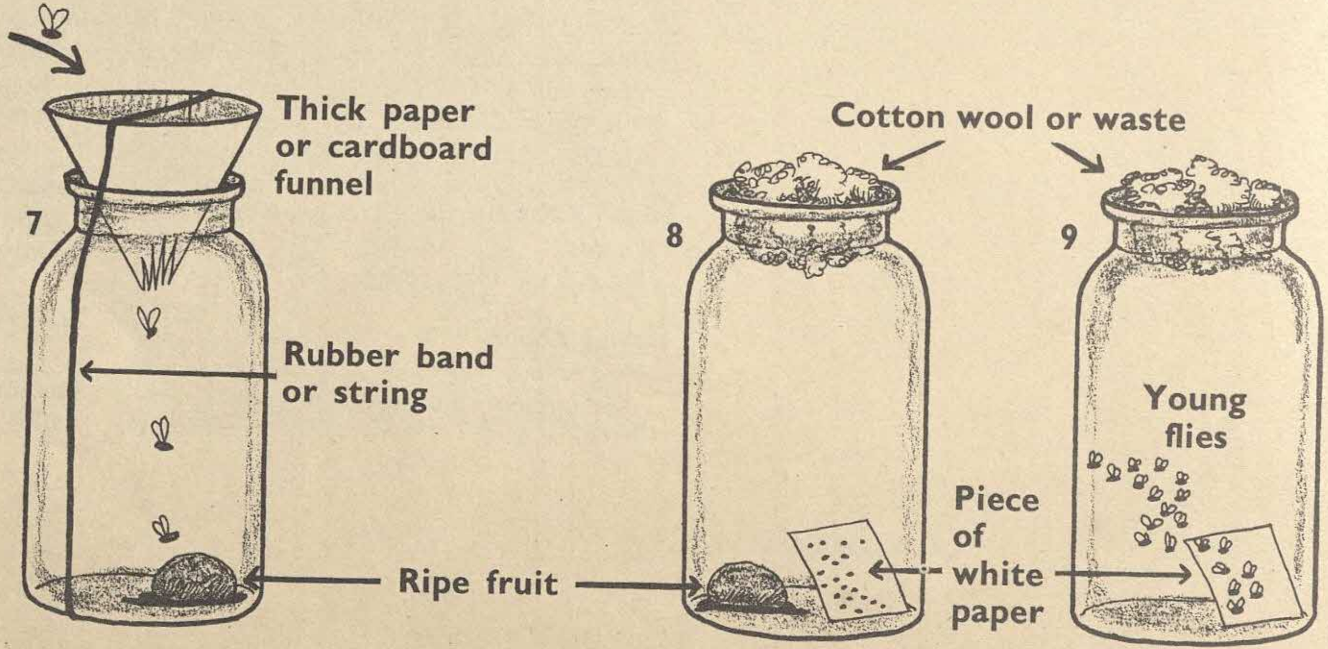
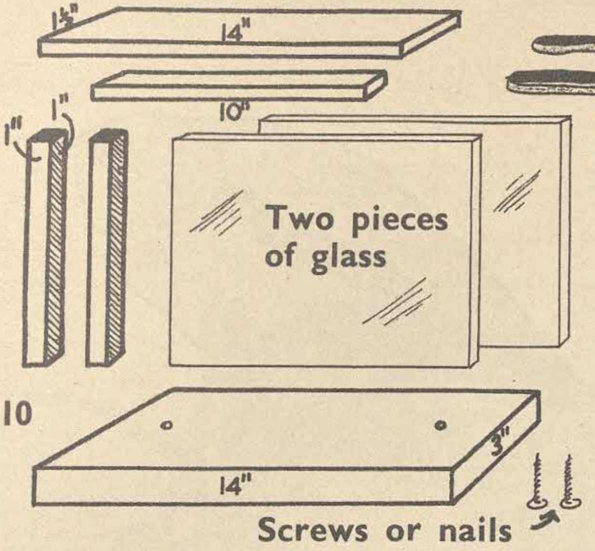


Ants



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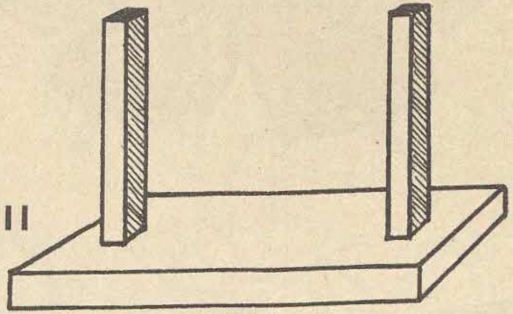

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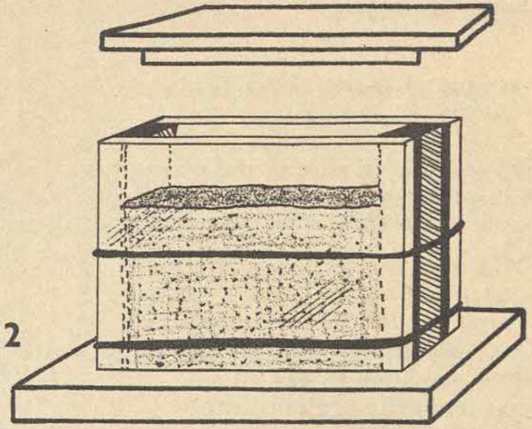

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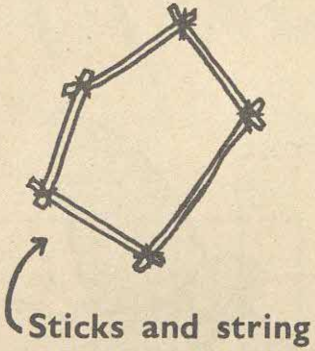

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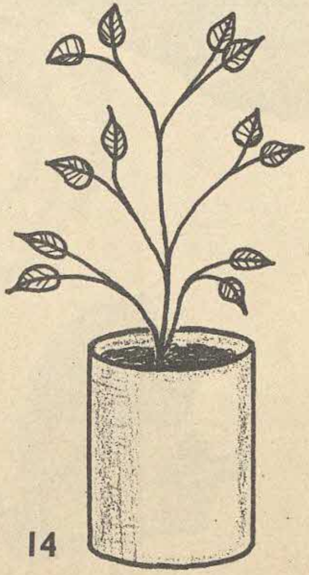

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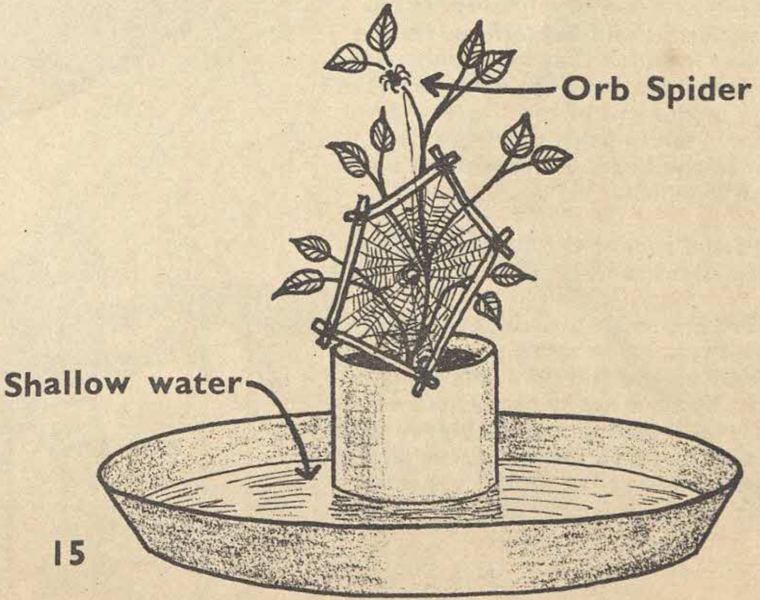

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Spiders

SMALL THINGS WITH JOINTED LEGS

Butterflies and Moths

Catch some of these in the nets you made when you were doing Book I.

Keep them with part of the plant, or at least some of the leaves of the plant on which they were found. See Book I.

Draw them.

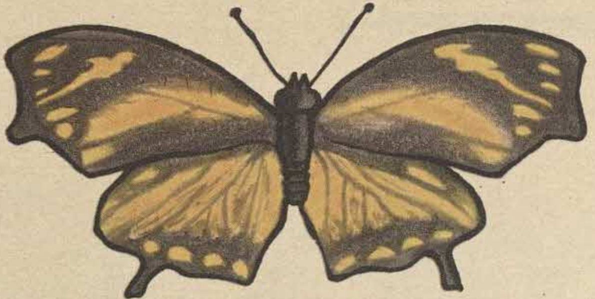
Look specially for the eggs and keep them long enough to see all the changes from the egg until the creature flies away.

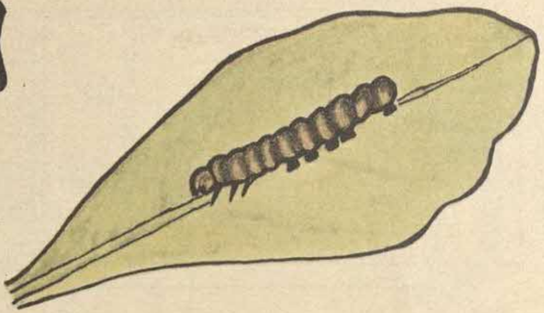
There are two big differences between Moths and Butterflies. One is the way in which they hold their wings when they rest, and the other is in the shape of the end of the 'feelers' or antennæ which stick out from the front of the head. See if you can find which is which.

Kill and mount the Butterflies and Moths. Draw and label them.

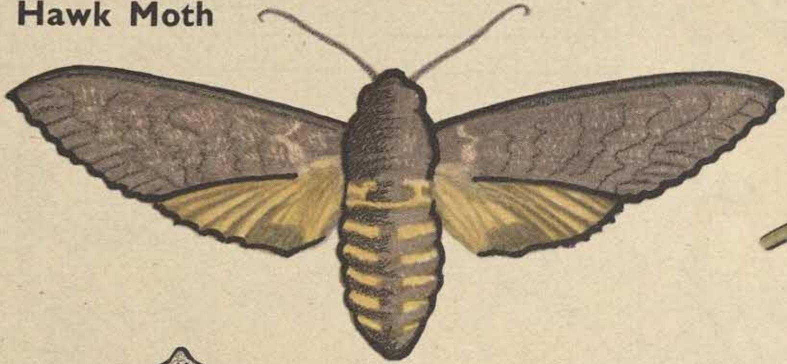
Here are some drawings of a Spider and a Fruit Fly to show you the sort of drawing you can do of the thing you catch. You are *not* to copy these drawings. Make your drawings bigger than life size, but also show the true size in a little drawing (as on the opposite page).

Orange Butterfly



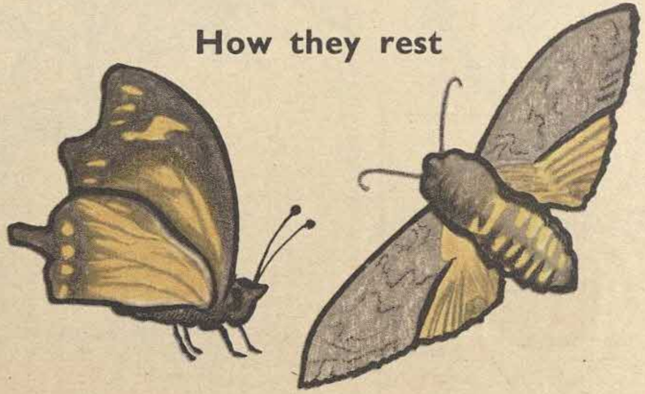


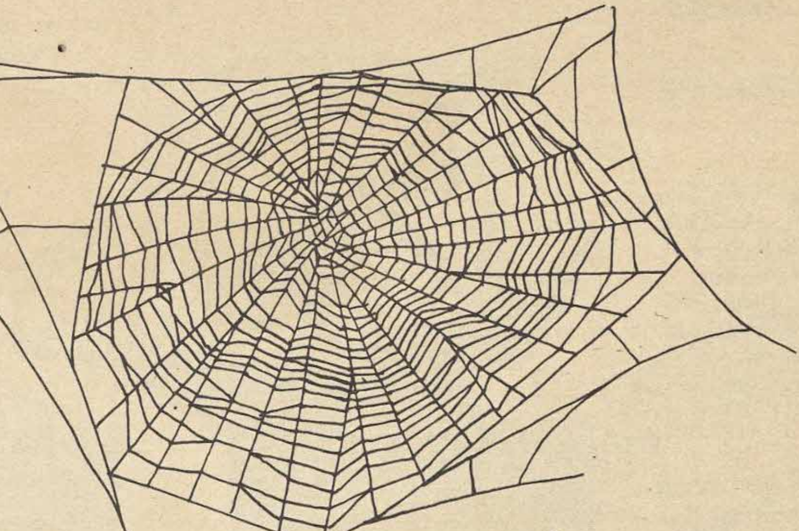
Hawk Moth

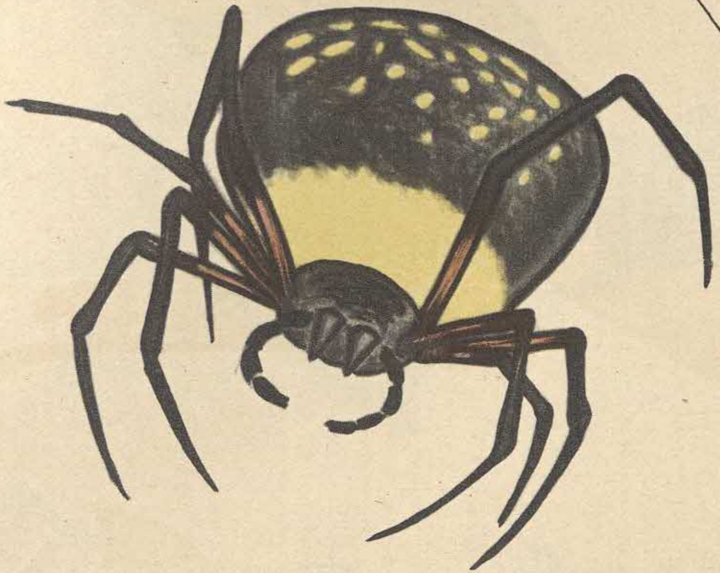


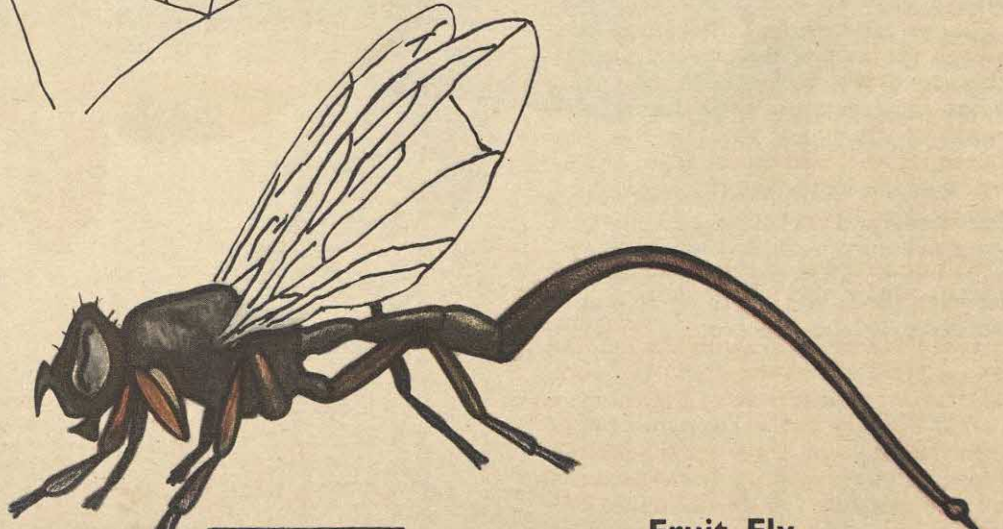
Pupa

How they rest









Fruit Fly

SMALL THINGS WITH JOINTED LEGS

Ant Lions, Weaver Ants, Centipedes and Millipedes

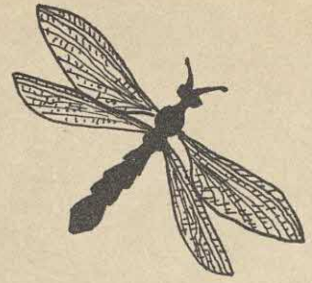
1. Find the hole of an Ant Lion in a sandy place near the school. How big is the hole? The pictures show how it catches ants for food. Write about this in your own words. In time, it turns into the big winged insect. It is difficult to find because it flies at night, but do try hard to get one. *Capture an Ant Lion, kill it in the 'killing bottle' and draw it.*

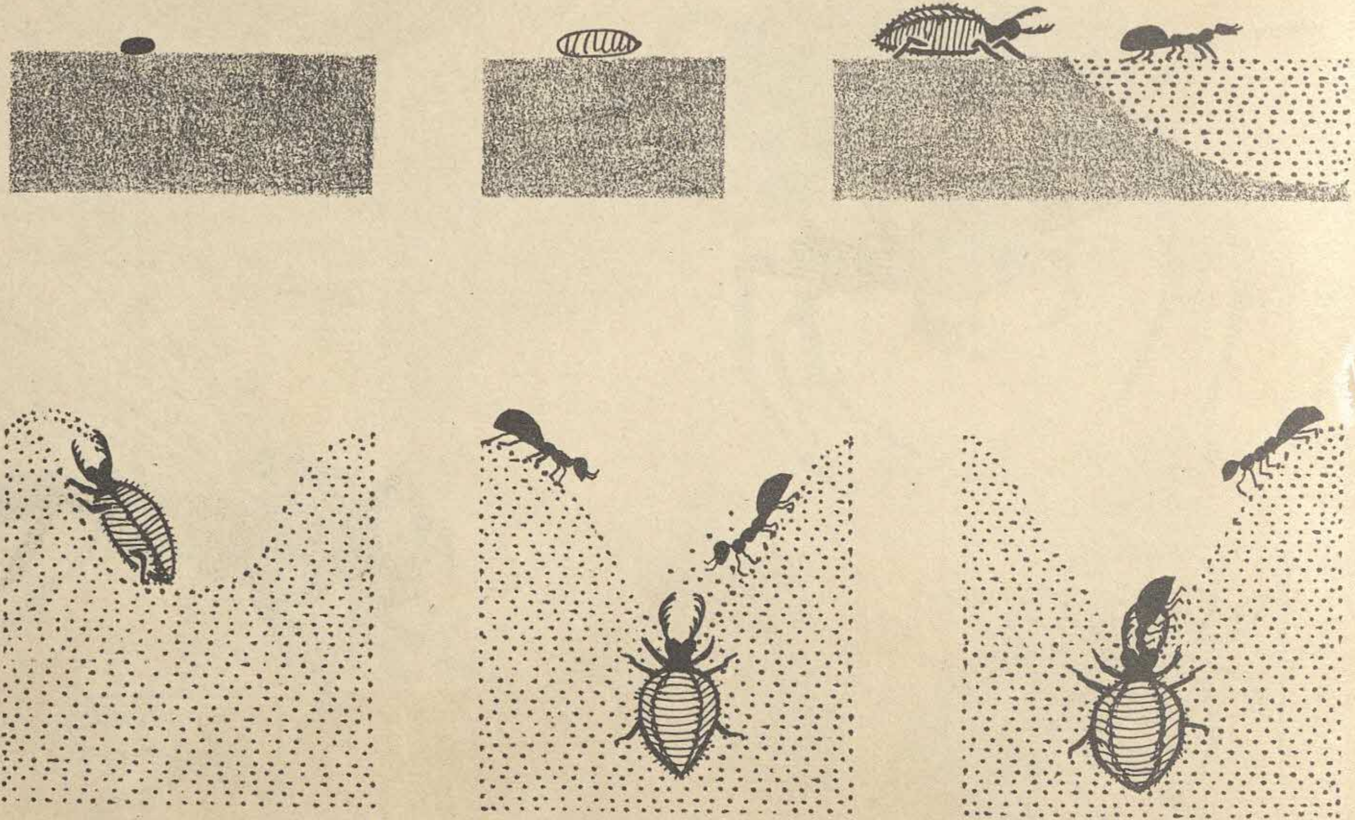
2. What are these ants doing? What are they carrying in their mouths? Where does the thread for joining the leaves to make the nest come from? During the next week see these ants at work, and in the next lesson write about them in your Nature Diary. Collect some of the nests.

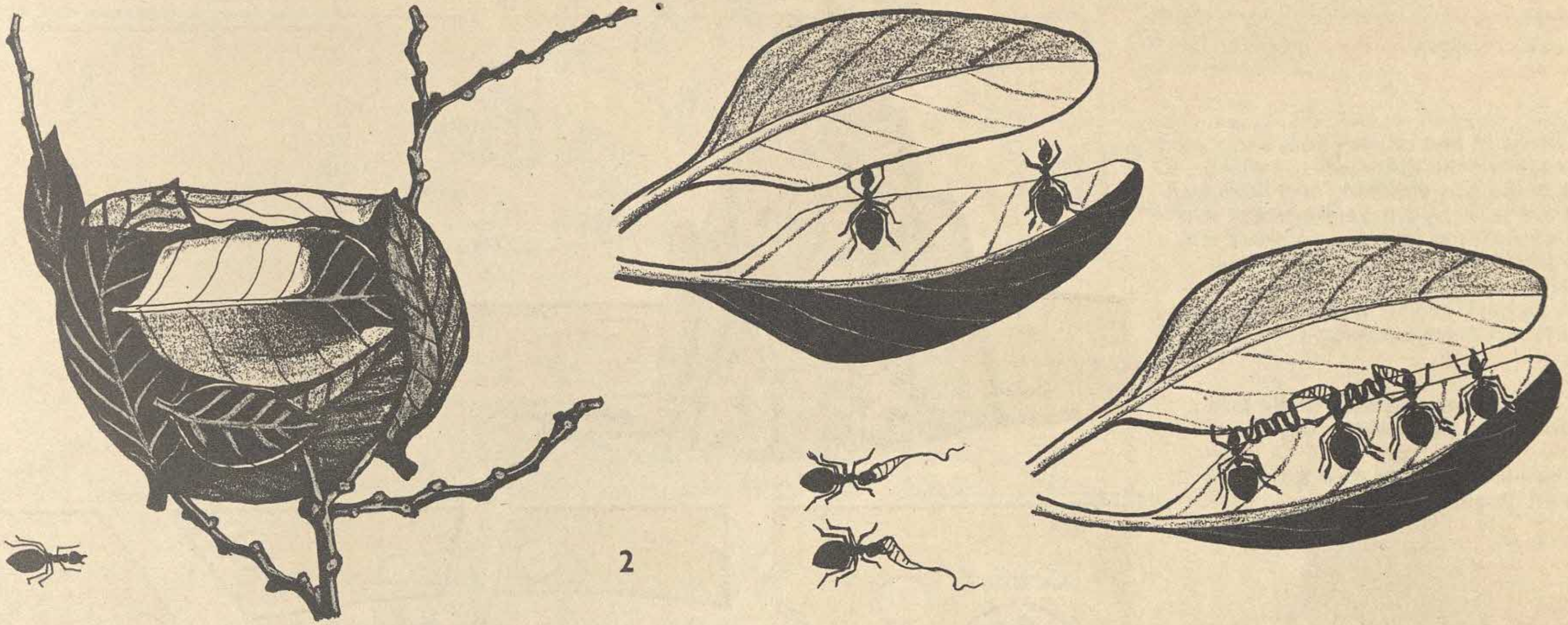
3. What is the difference between a Centipede and a Millipede? *Collect, kill and draw some of each.* **Say where they were found, what the differences are between them and anything else you can discover about them.**

Ant Lion

I







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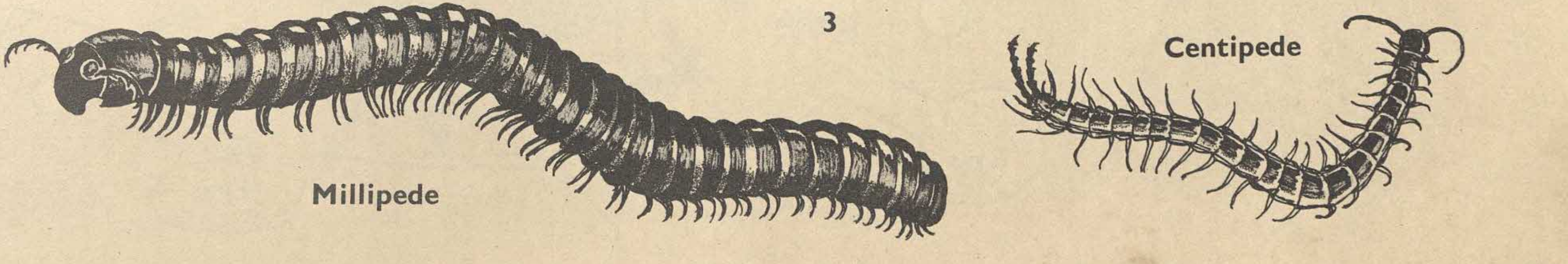


3

SMALL THINGS WITH JOINTED LEGS

Ants and Termites

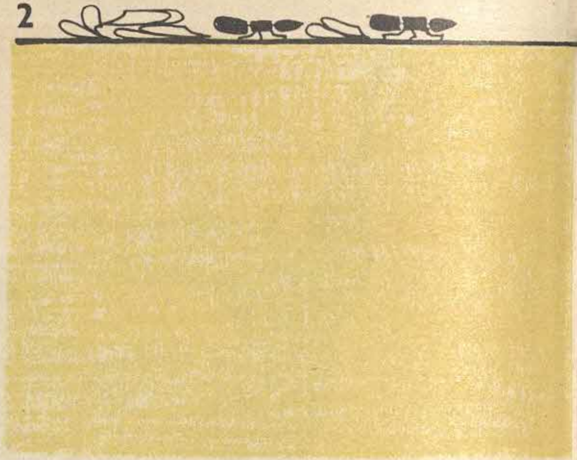
Collect some examples of each. **Make drawings of one of each kind and write down the differences in colour and in the way the body is divided up. Collect as many different kinds of ants and termites as you can.** *You should start four or five days before the lesson.* **They should be killed and mounted with pins on cork or soft wood. Say where you found them and what they were doing.**

The class may be able to dig into a termite hill and find the Queen.

The pictures show how a termite 'Town' begins.

1

2



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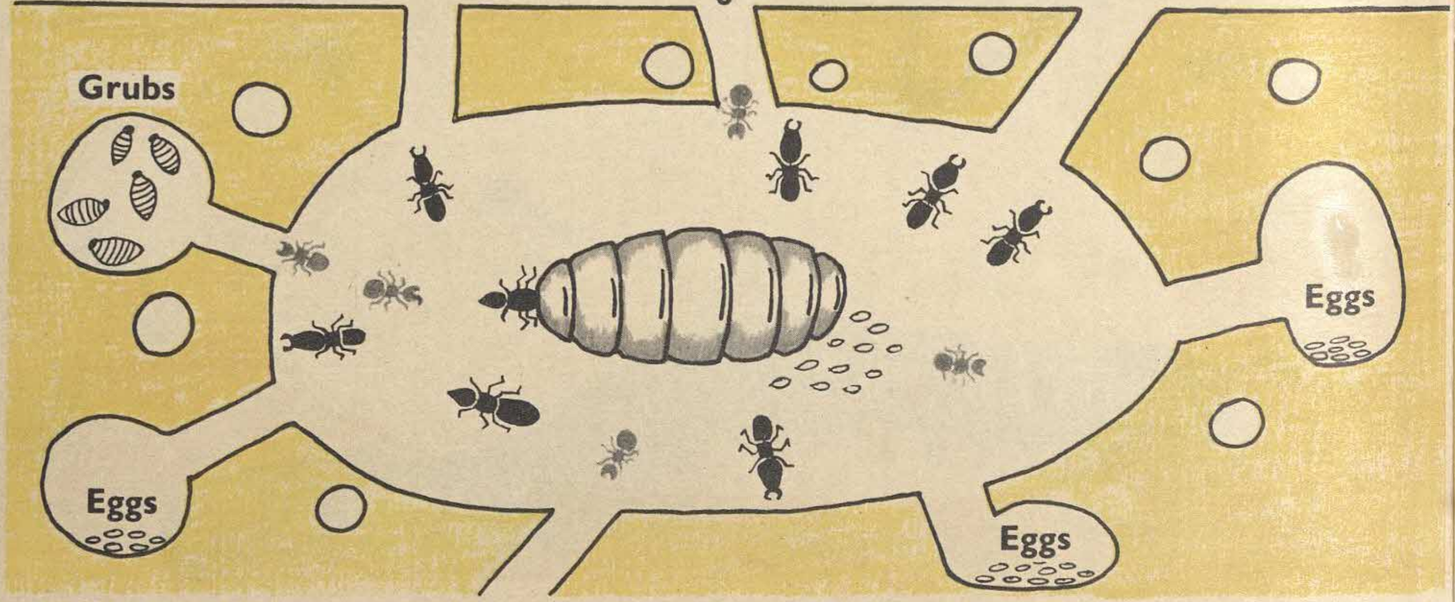

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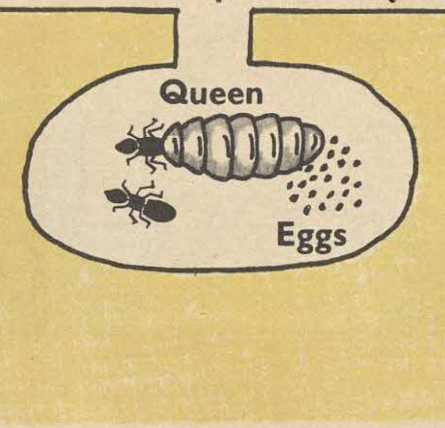
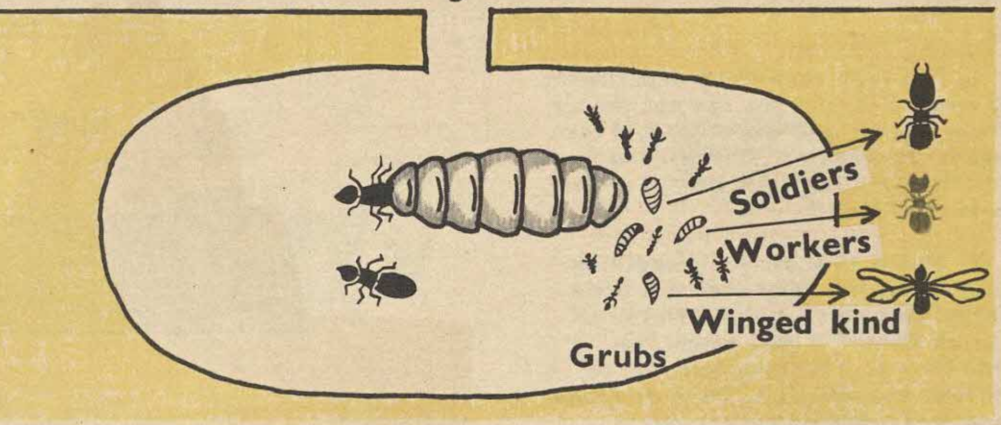
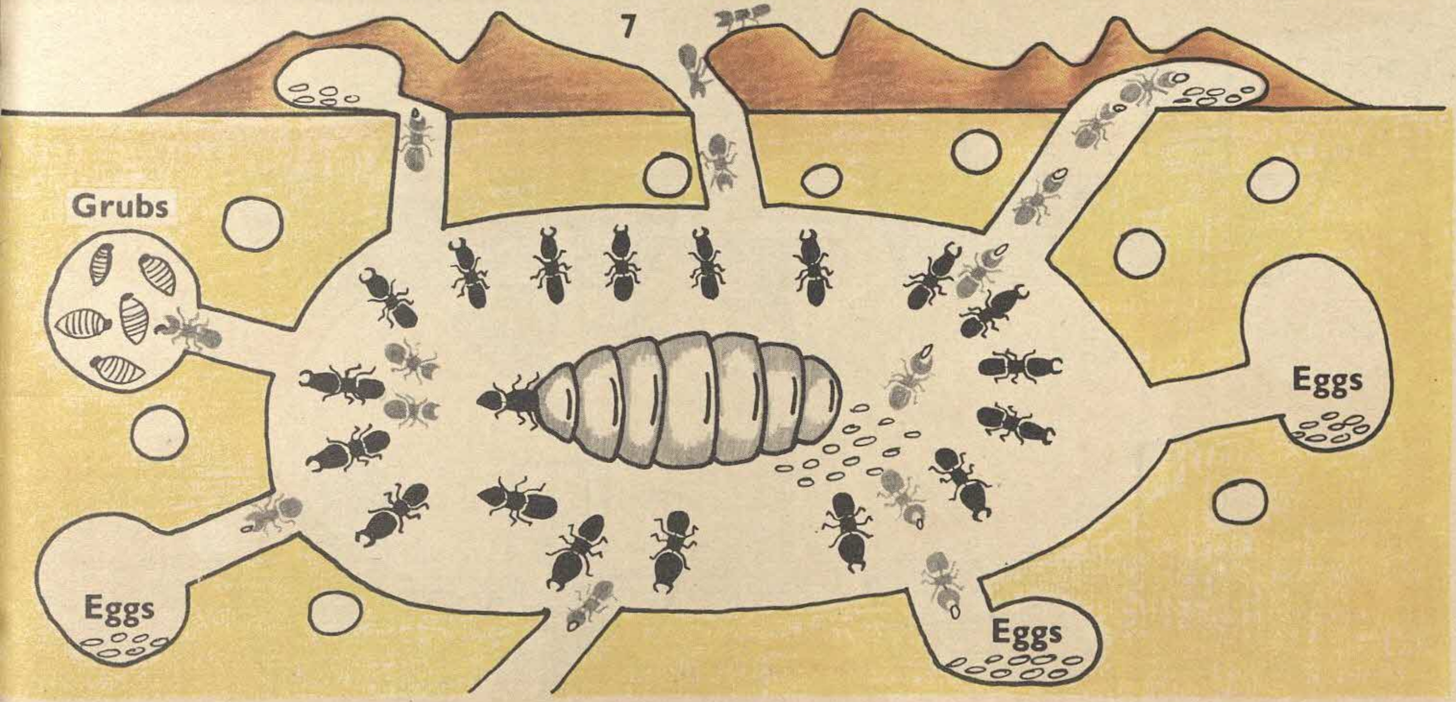

Queen
Eggs

5


Soldiers
Workers
Winged kind
Grubs

7


Grubs
Eggs
Eggs
Eggs

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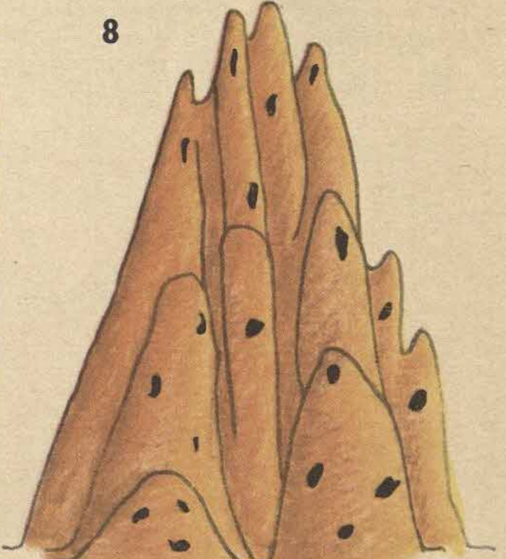


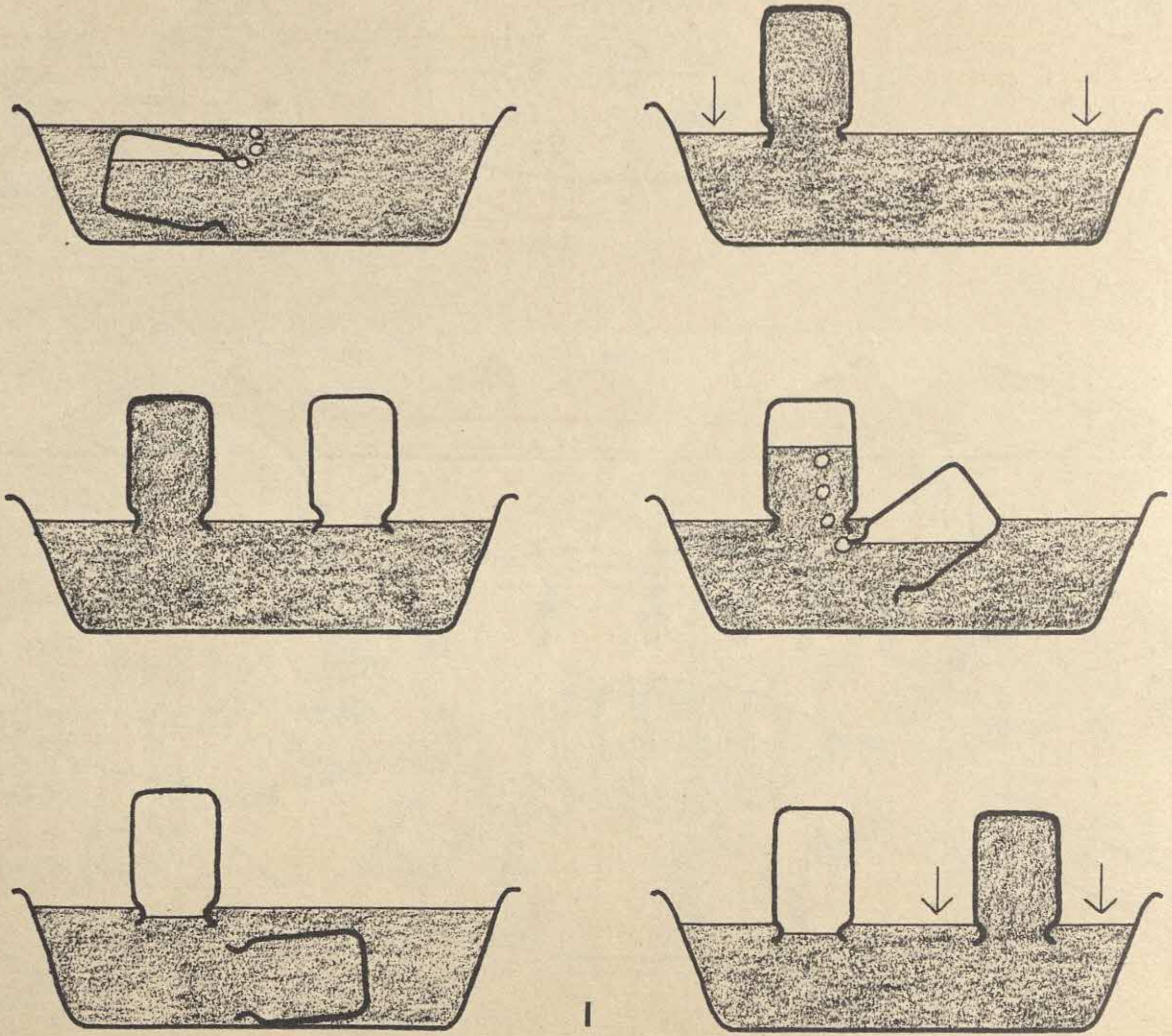
AIR AND THE WEATHER

Air

1. This is an easy group experiment. If you are careful you can put the air from one jar into the other and back again under water. This helps us to see that, although you cannot see air, it is real.

2. This is to show you something else about air. Why does this little wheel go round when held over a candle flame? It goes round, too, if you blow it. This may help you to answer the question. Think carefully and write down your answer.

Air occupies space



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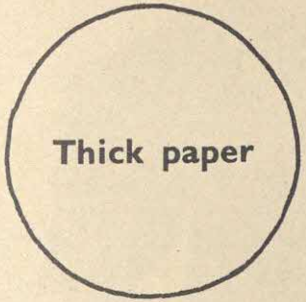

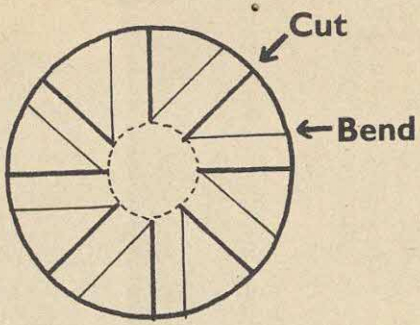

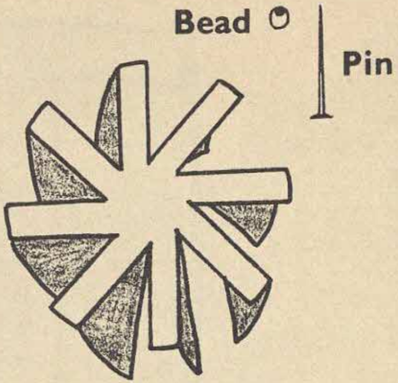

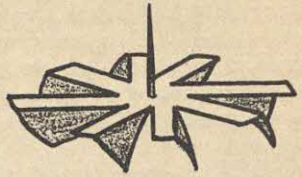

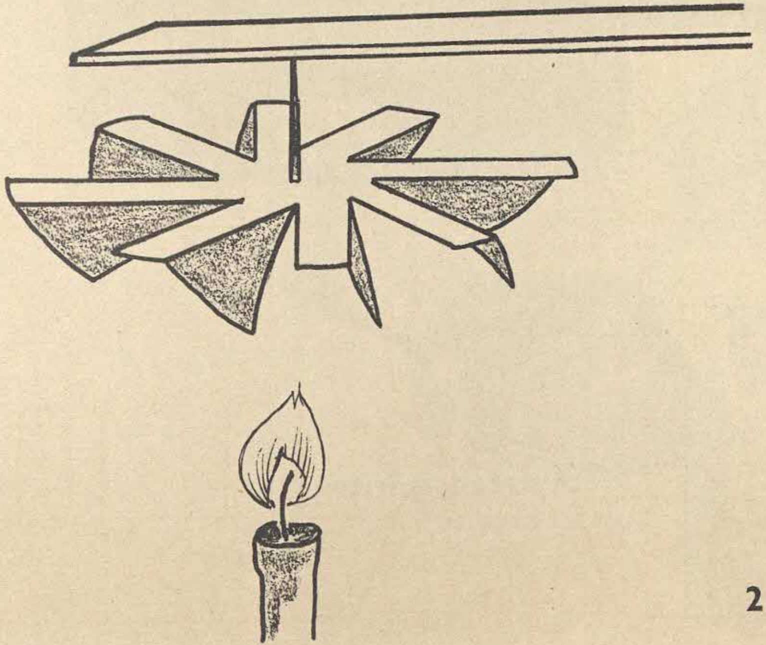

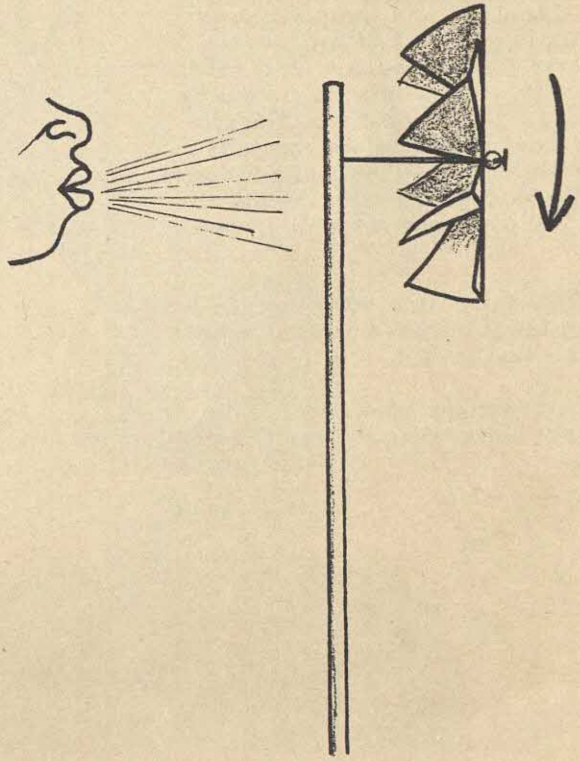

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More about Air

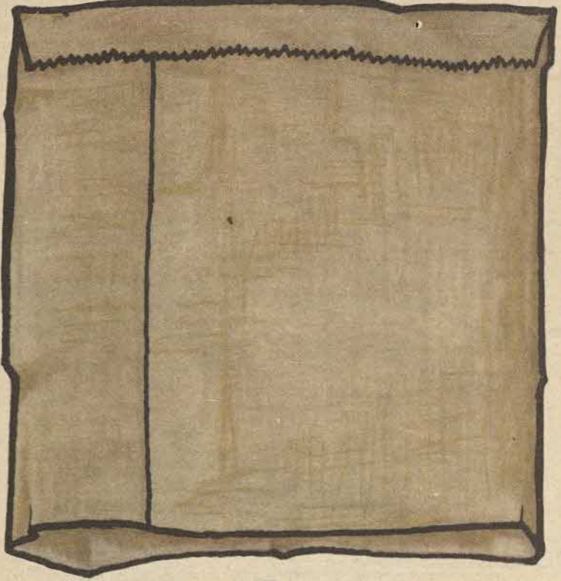
Make a really big paper bag of thin paper. Air-mail edition newspaper is the best kind. The thin pieces of wire or cane are arranged to keep the bag open. Cotton-wool or kapok is tied with cotton to the centre. This must then be soaked in methylated spirits or kerosene. Hold it upright. Light the kapok or cotton-wool and after a little while let the 'Balloon' float up into the air.

You could have a competition to see which group's balloon goes the furthest. One of the first ways men were able to rise into the air was by making a very big balloon. The picture shows a famous one made by a Frenchman called Montgolfier. Notice the fire underneath to make the air hot. It did not go very high or very far.

Write down what you think the difference is between air that is hot and air that is cool.

What happens when some of the air is made hotter than the rest ?

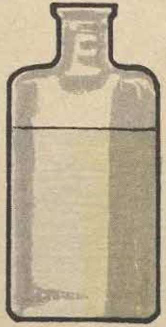
What you Need



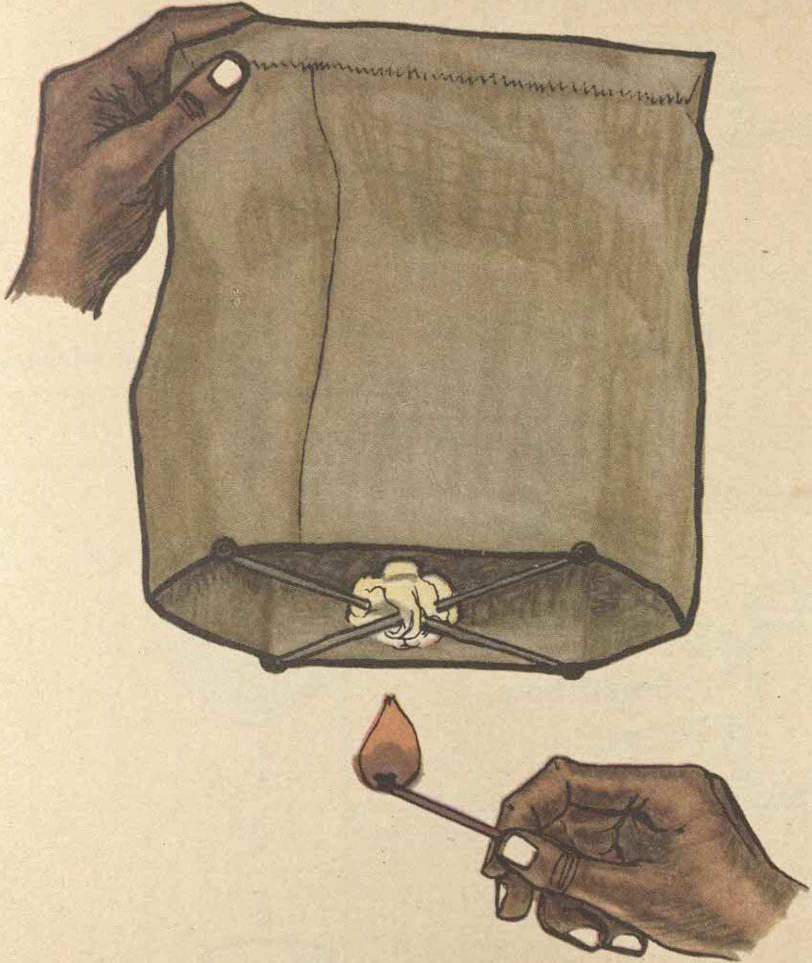
Large paper bag at least a foot across

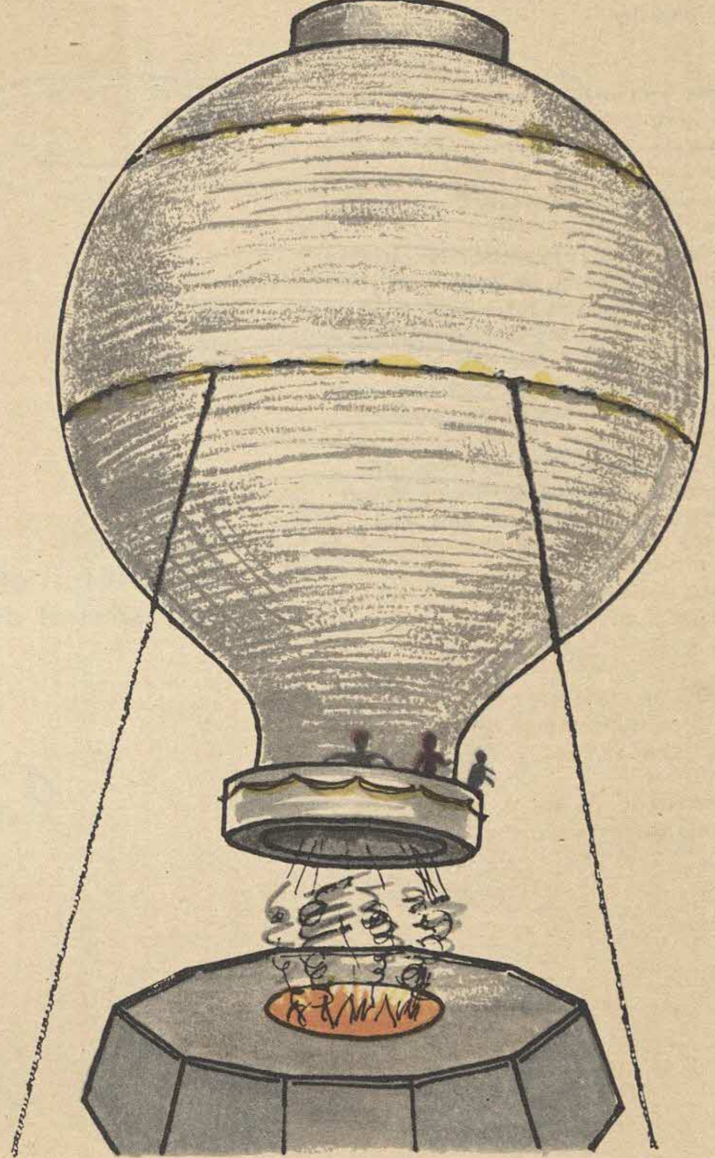
Two pieces of wire

Cotton wool or kapok



Methylated spirits or kerosene





AIR AND THE WEATHER

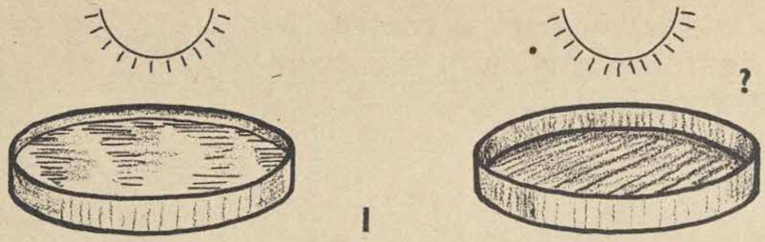
Water and Air

1. Do you remember how water goes away if you leave it in a tin lid? Where does it go to?

Can you get the water back again?

Perhaps you remember the kettle and the cold plate in Book I. If you have no kettle, use a tin with a lid and a hole in it. The big bottle must have the cork firmly in the top, or we might think the drops of water had somehow come out of the bottle.

Try 3. Where did the drops of water come from this time? What does this tell you about the air?



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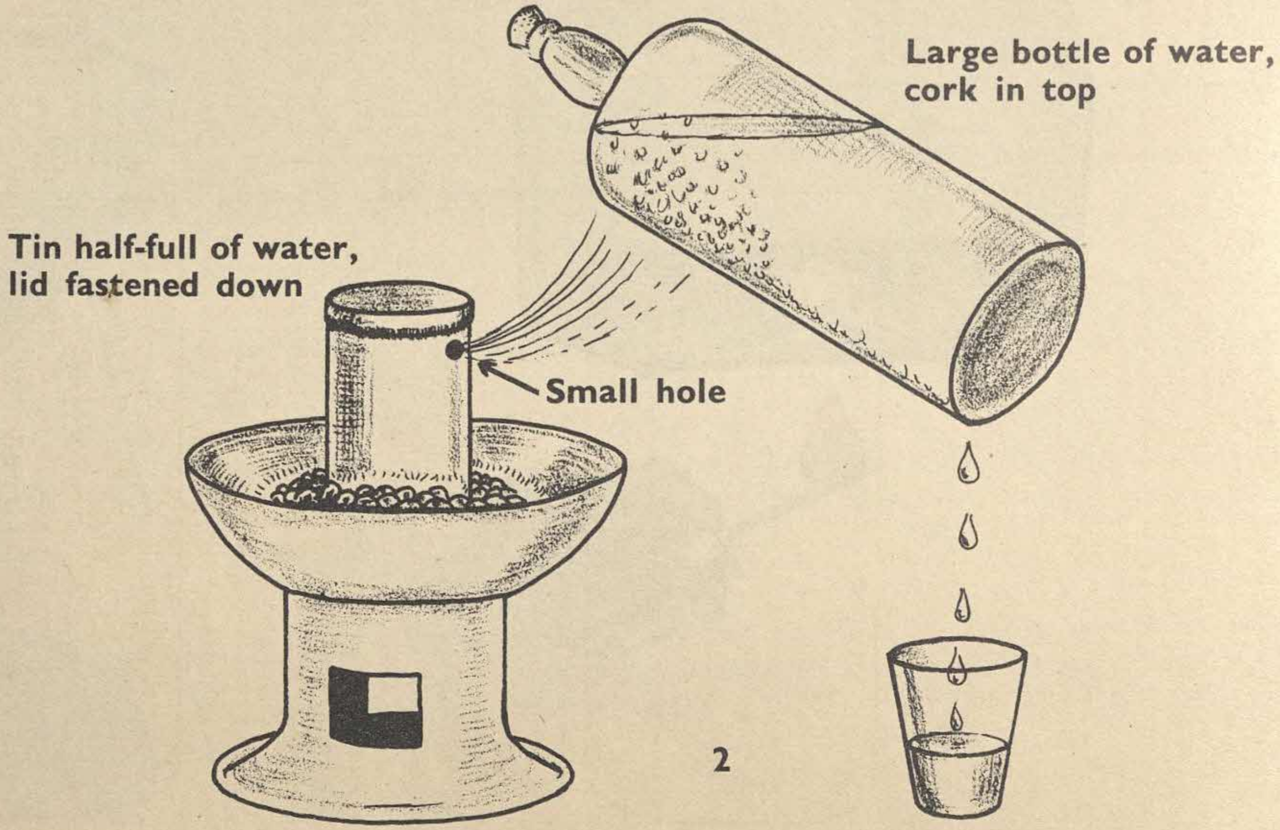
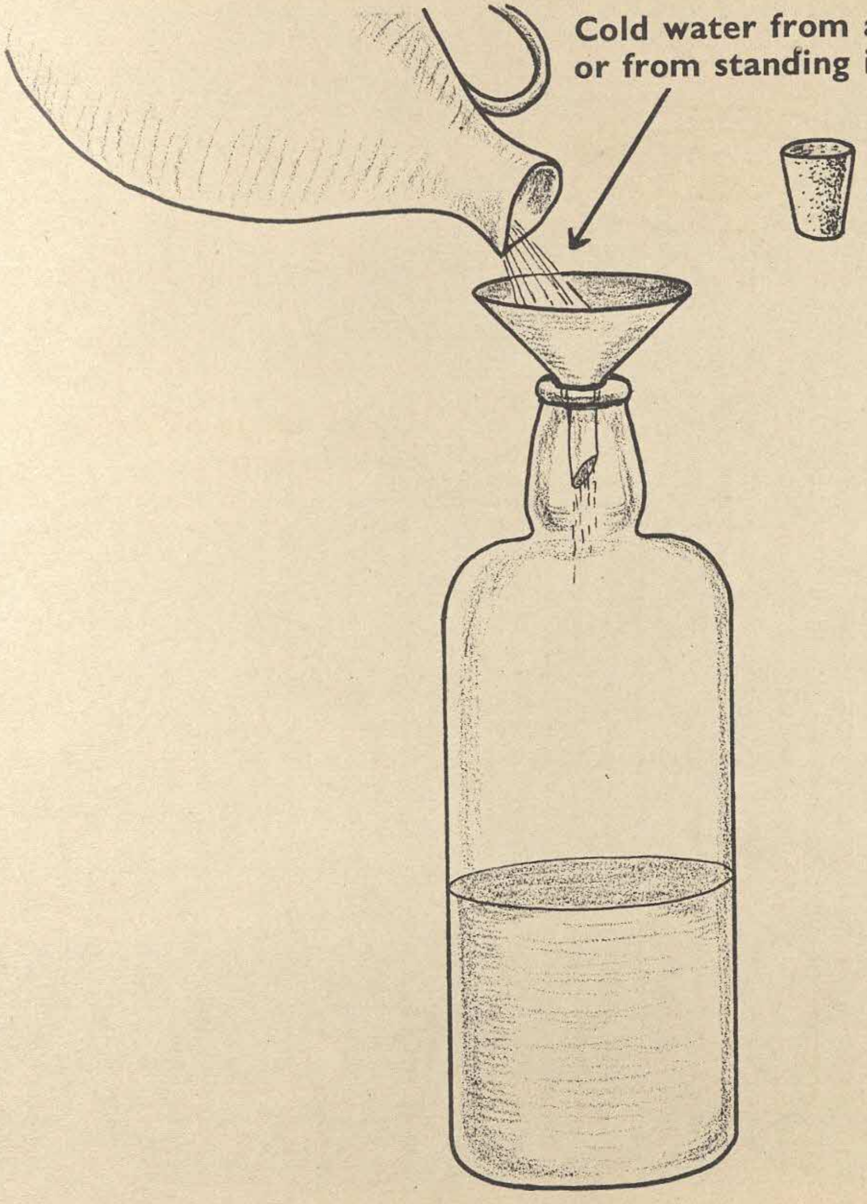
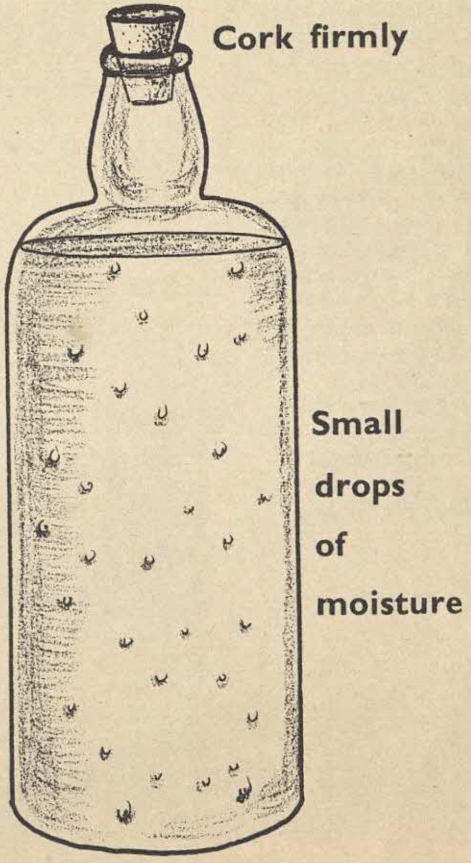

Large bottle of water, cork in top
Tin half-full of water, lid fastened down
Small hole

2


Cold water from a cooler
or from standing in the shade
Cork

3


Cork firmly
Small
drops
of
moisture

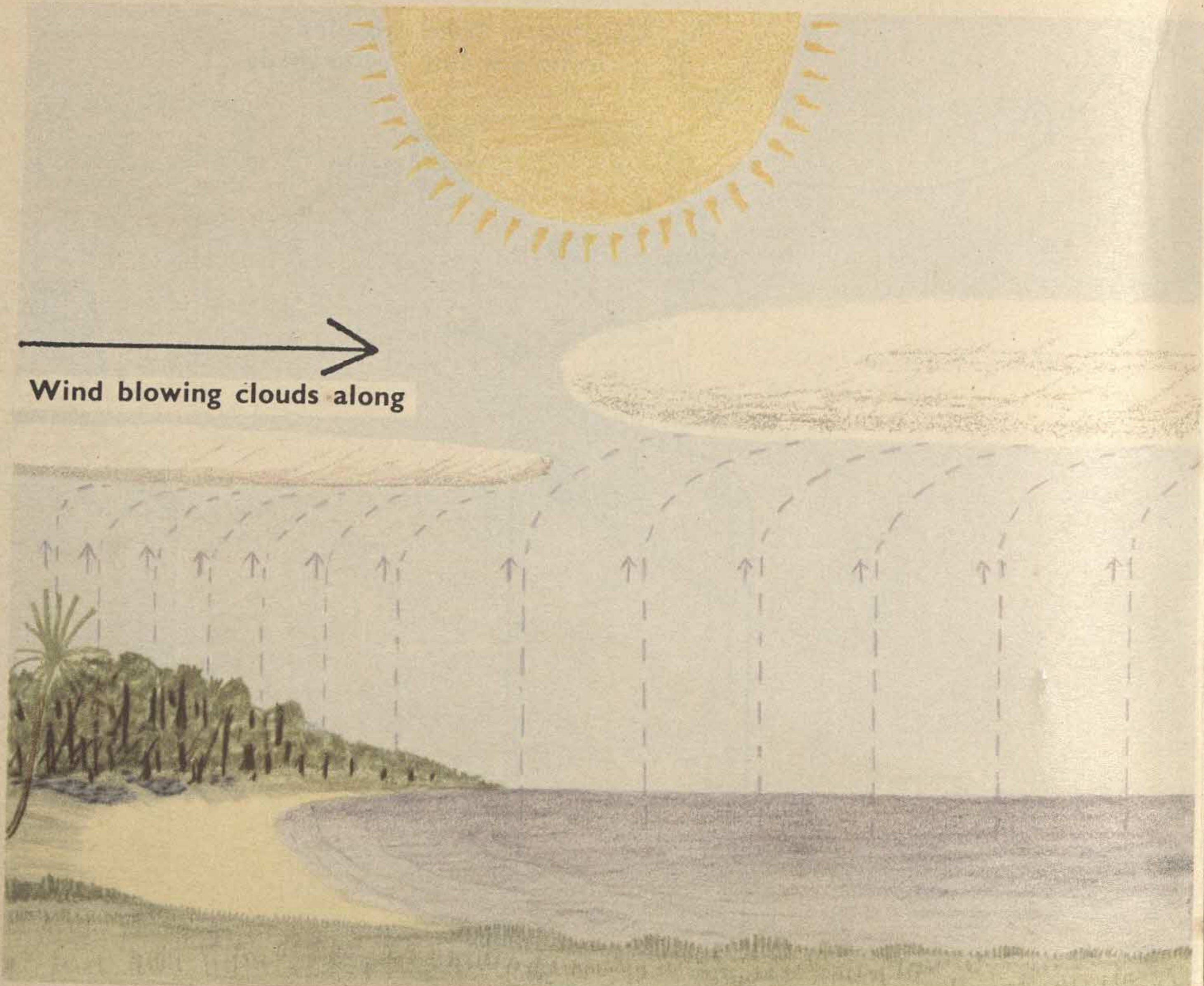
AIR AND THE WEATHER

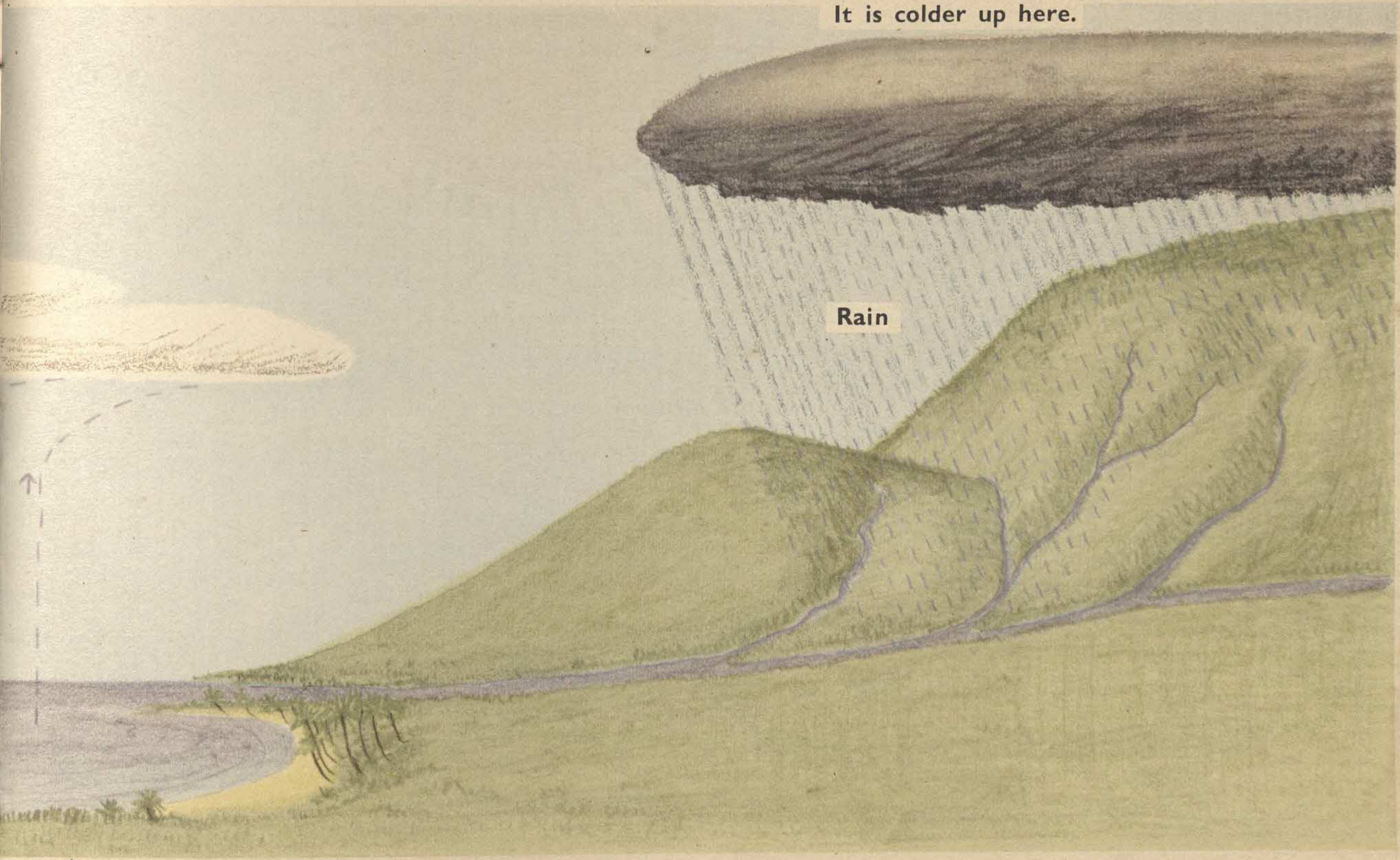
Sun, Water, Clouds and Rain

All the time water from the plants, the sea, the pools and rivers rises slowly into the air. It goes into the air best when the sun is hot.

The warm air goes up. High up in the air it is cooler, and little drops of water come out of the air as they did in the cold bottle. They come out best in air with dust in it. When this happens, the little drops of water are so small that they remain together as clouds and float along in the air.

When the cloud comes to a cooler place, perhaps when it is made to go higher over mountains (as in the picture), the drops become bigger and are now too heavy to be blown along. Then they fall as rain. This comes into the rivers and the sea and everything starts over again. Write down what direction most of the rain clouds seem to come from. Where are the nearest places where there is a lot of water? Write down some of the things you have done to show how water goes into the air and comes out again when it is cooled.




It is colder up here.
Rain

AIR AND THE WEATHER

Clouds

Here are four kinds of clouds.

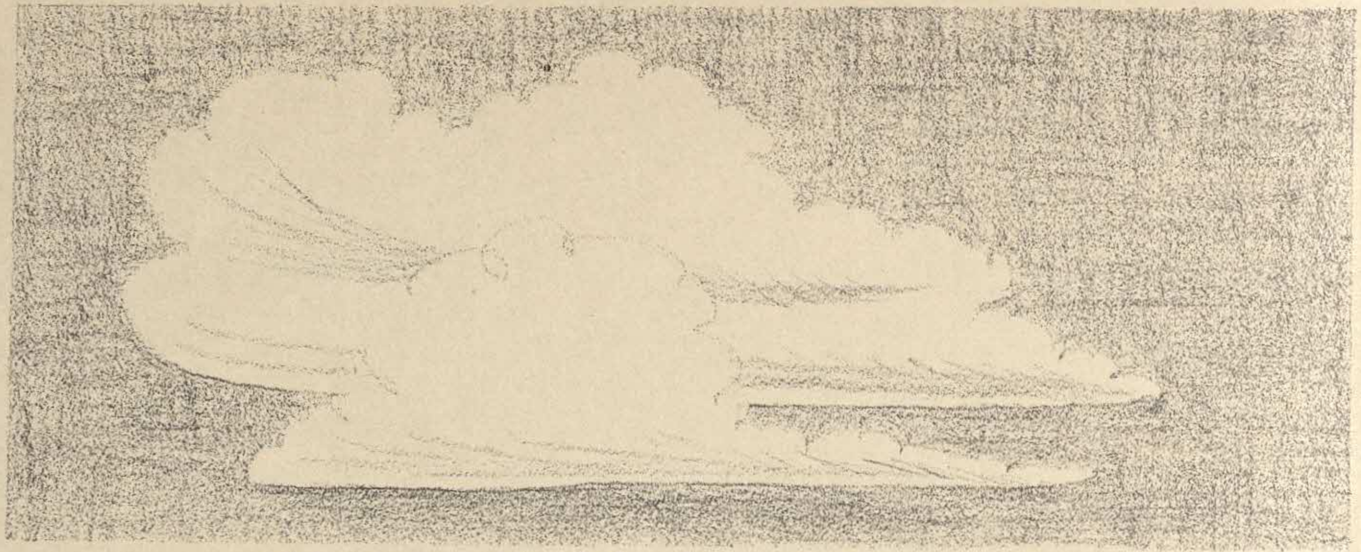
Go out and see if there are any today. Clouds in a big white heap. Dark rain clouds. High, curly, smoky clouds. Long, low, evening clouds.

What does each kind tell us about the weather we can expect? *See what the farmers or fishermen have to say about this.* They are the people who know best. Write down what they say.

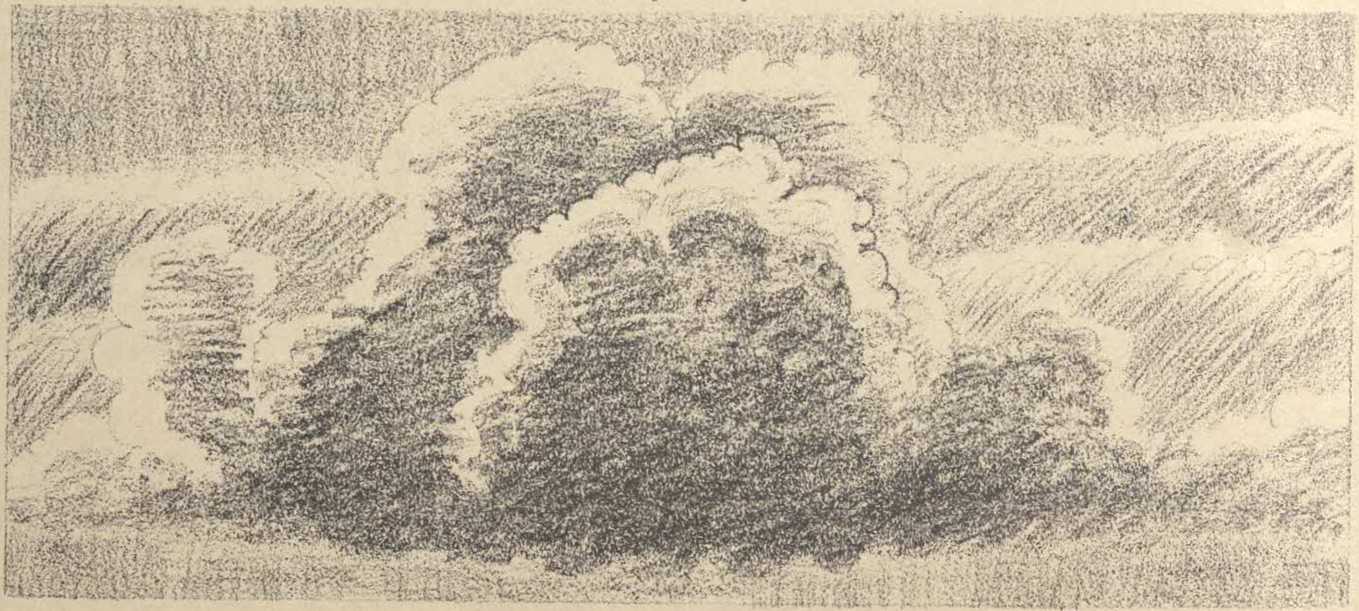
Look at your class weather chart and write down the number of days this year:

a When it has rained.
b When there have been clouds.
c When there have been no clouds.

Where do you think the rain clouds that pass overhead get their water from? Forest trees? Sea? Lake?



Clouds are made of tiny drops of water and dust.



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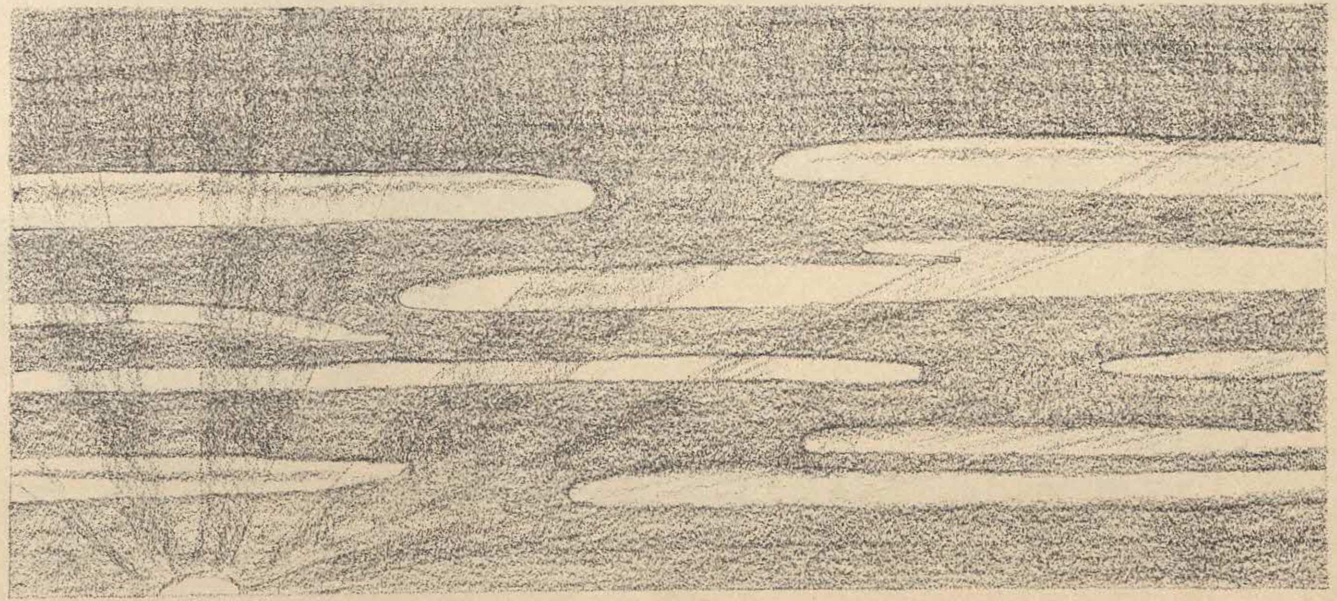


LOOKING AT ANIMALS

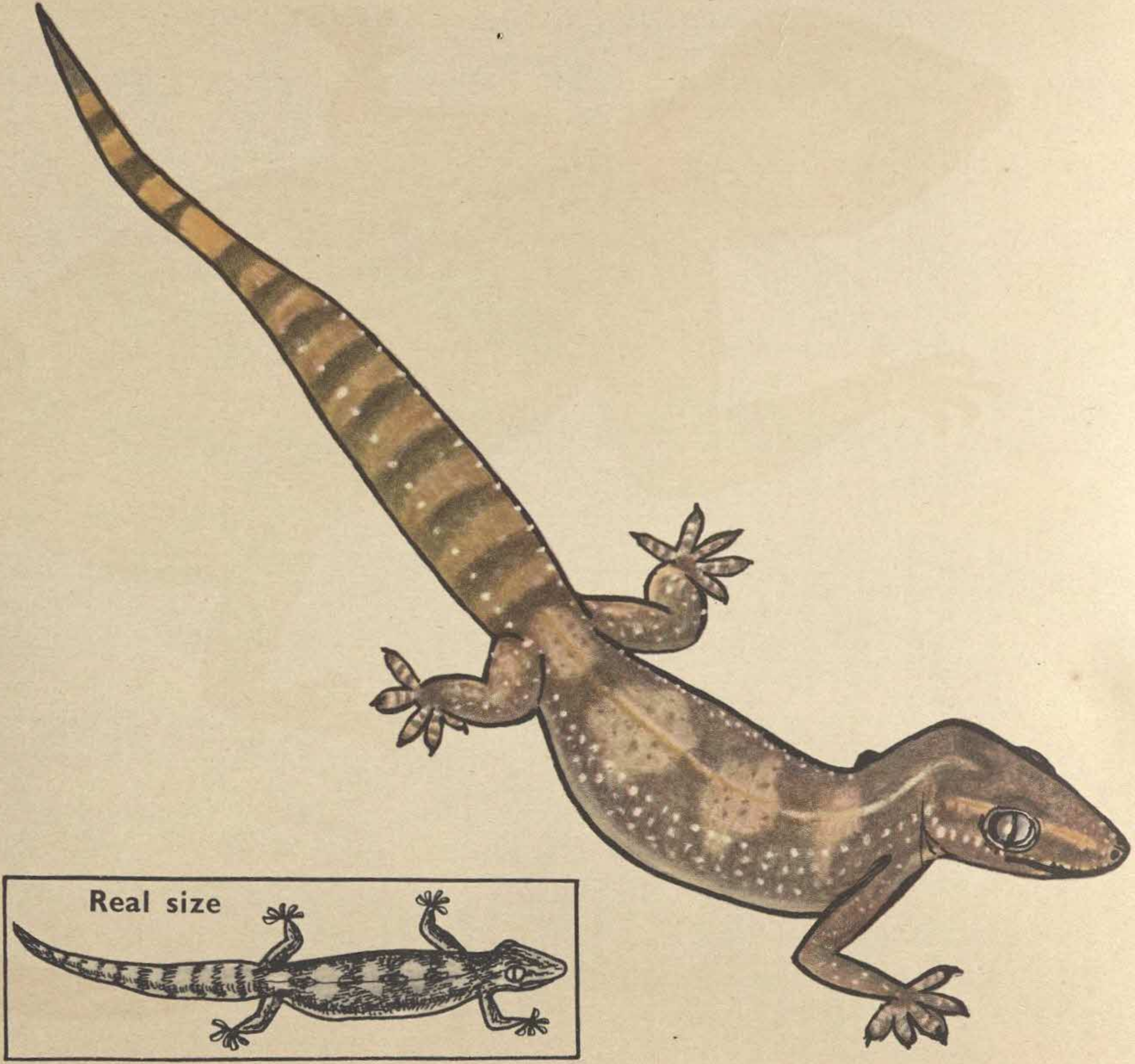
Lizards

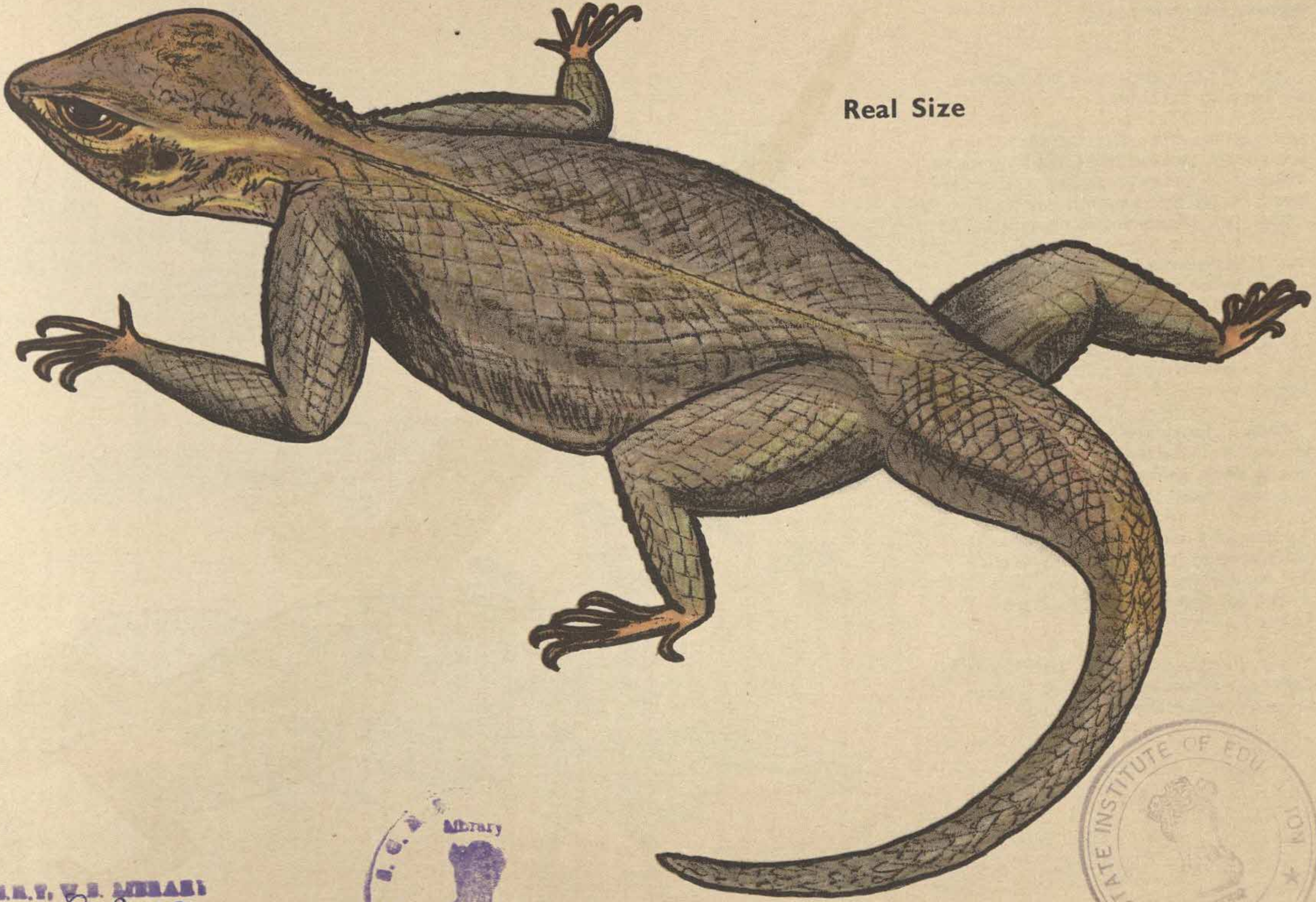
Keep some lizards in the classroom for two or three days before the lesson. **Provide them with water.** *Near them your teacher will put up the following questions.*

a What do they feed on?
b Do they change colour?
c Are the young ones like the older ones?
d What kind of eyes have they?
e What kind of feet?
f What differences can you see between different kinds of lizards?
g Where does each kind live?

When the time for this lesson comes, you should be able to write many of these answers in your book.

Draw the head and feet of different kinds of lizards. ***Do not copy*** **any from this book.**





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LOOKING AT ANIMALS

Animals and their Young

Some chicks, a cock and a hen should be borrowed for this lesson.

What are the differences between the chicks and the hen? What are the differences between the cock and the hen? For all the animals you know, make lists of the differences:

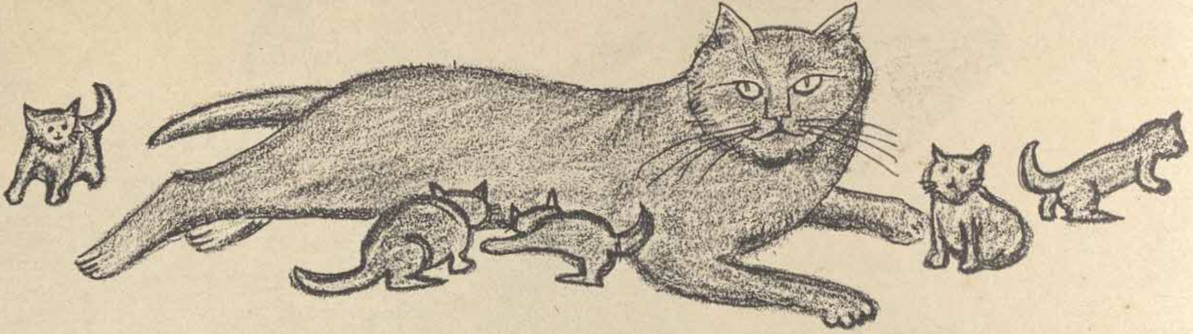
a between young and old,
b between male and female.

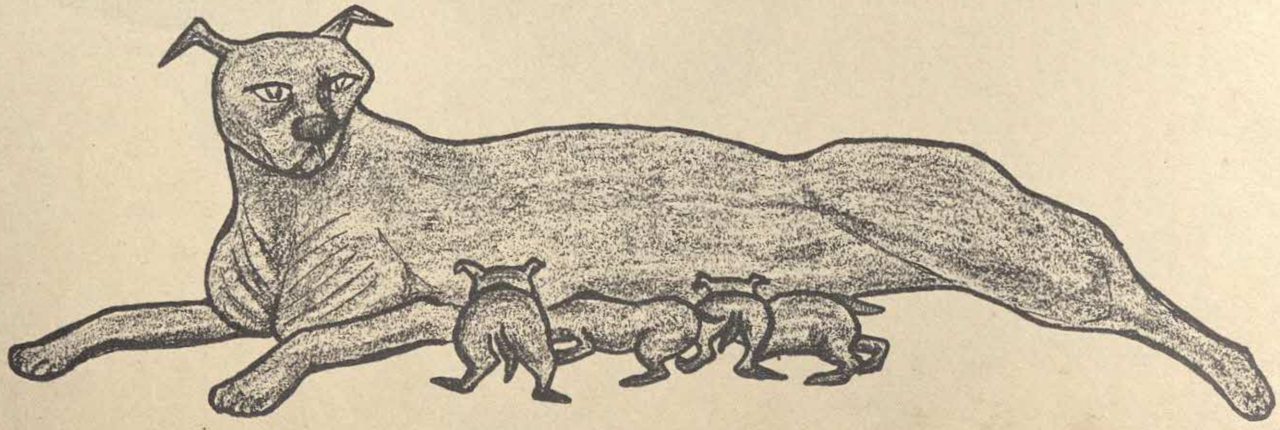
Write a list of the animals that come from eggs and another list of the animals that do not come from eggs.

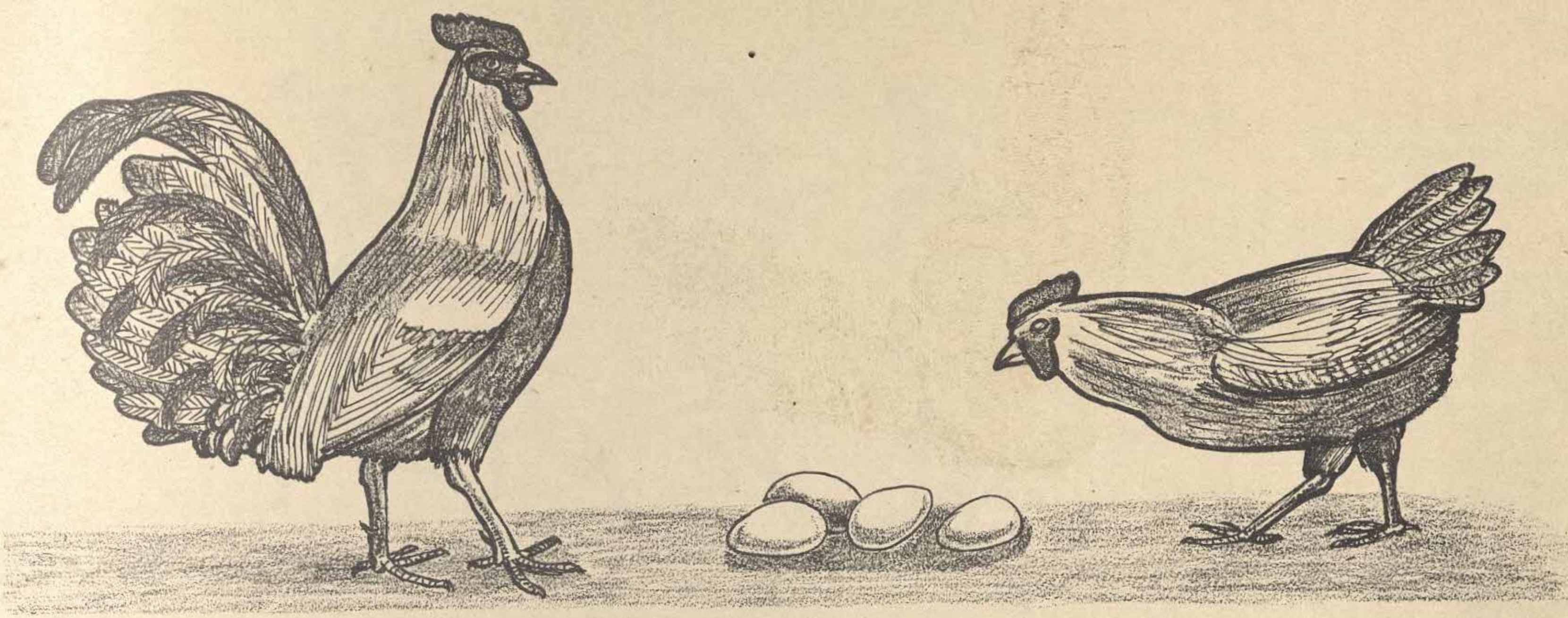
Animals with fur are different from the others. Watch some of them, cats, goats, dogs, and answer the following questions next week.

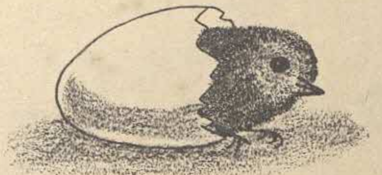
How long after it is born can the baby animal (cat, dog, goat) walk? Eat food other than its mother's milk? Go and find its own food? Leave its mother?

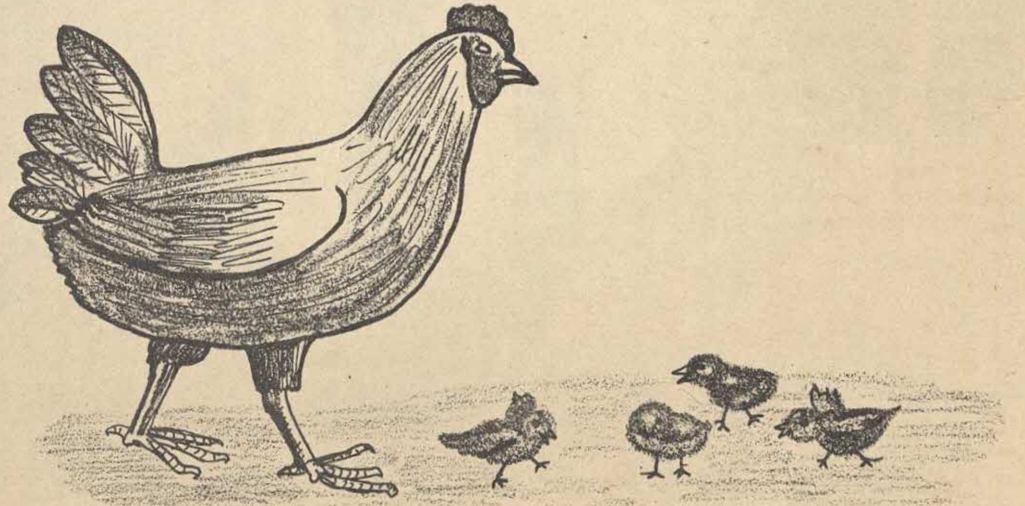
If you know any of the answers to these questions about other furry animals, write them down too.











MOVING ABOUT

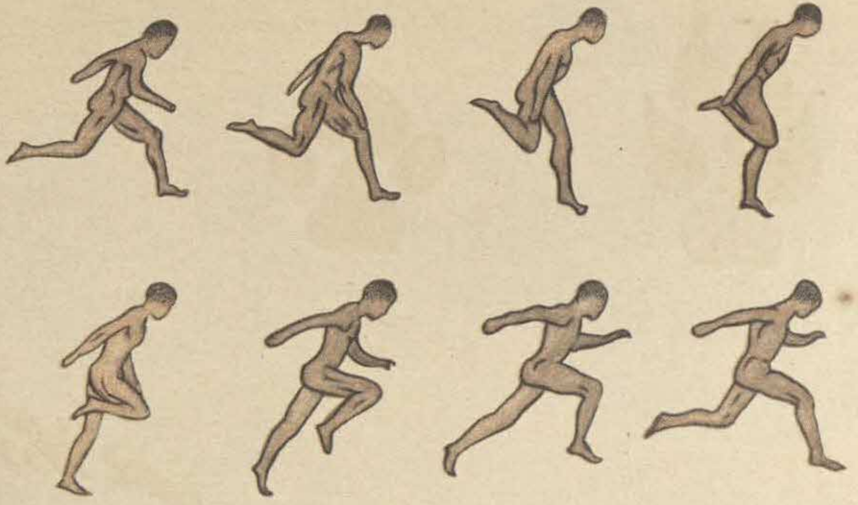
How Animals Move

1, 2, 3. Here are pictures of the way some animals move. Some of the pictures were made with a cinema camera.

4. Here are two prints of animals' feet. Do you know which animals leave these marks?

Do you know the marks of any other animals? If you do, draw them and put the name of the animal beside the drawing.

Watch a chameleon or a large beetle or other insect move. If one of the class walks round the room slowly, try and draw a line of pictures like these to show the way we *walk*.



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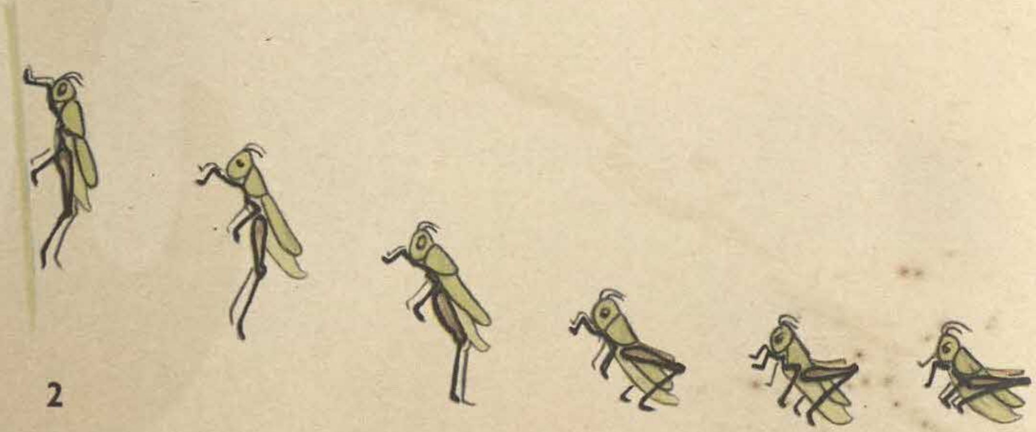

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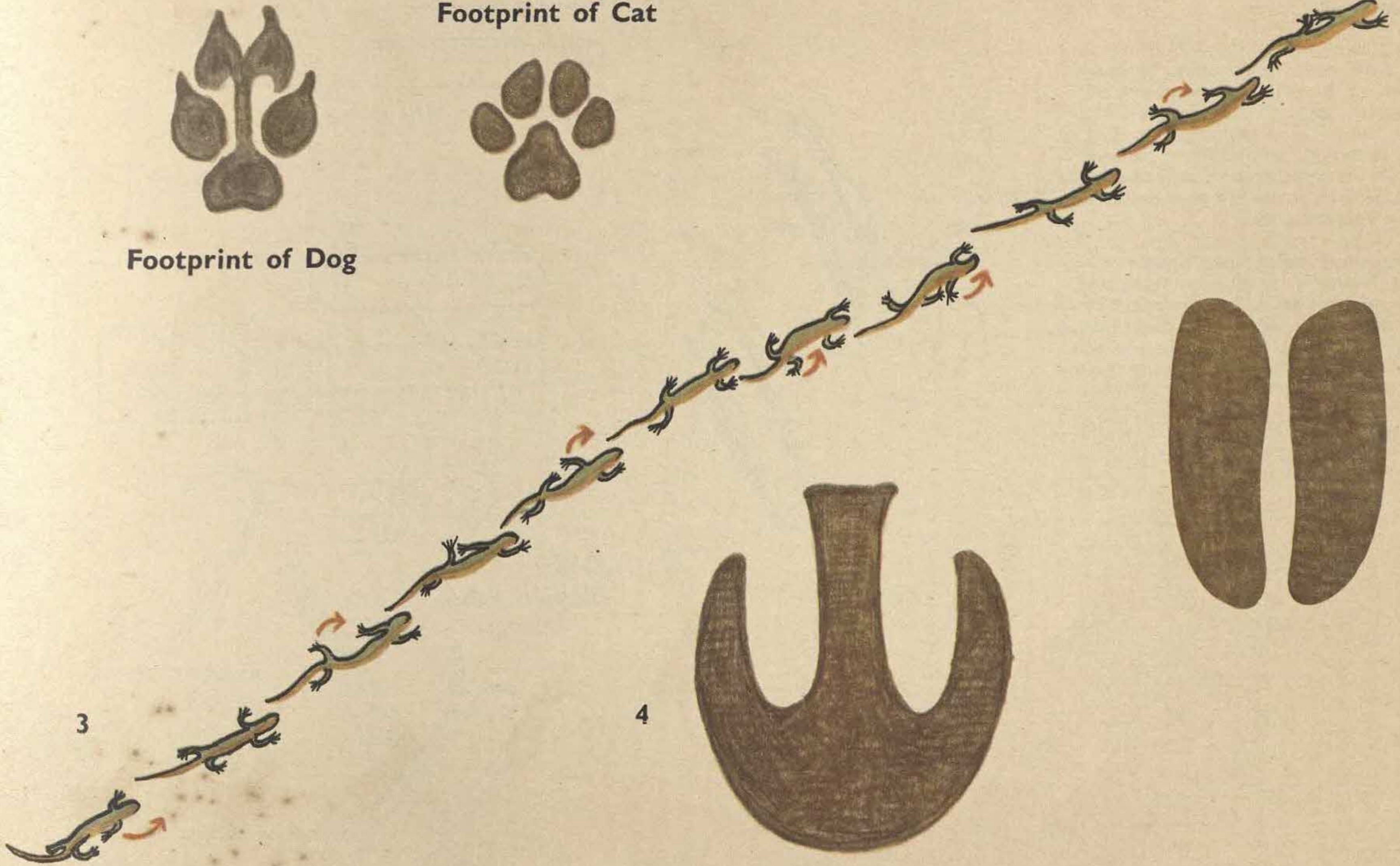


Footprint of Cat

Footprint of Dog

3

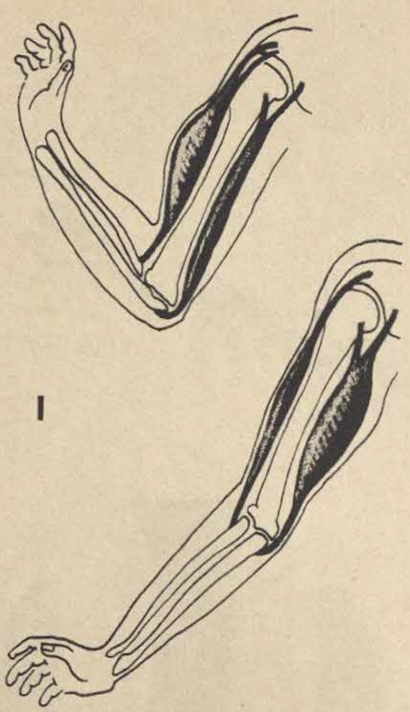
4

MOVING ABOUT

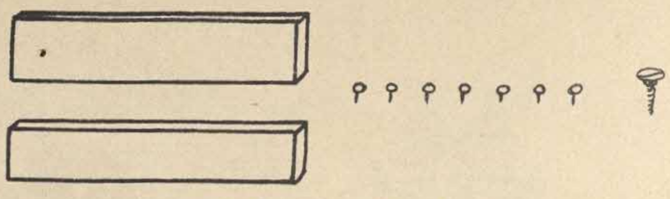
What is there inside us that makes us move?

1. This shows a 'cut-away' picture of your arm when it is straight and when it is bent. It is the muscle that pulls the parts of the arm together so that it moves, and another muscle pulls it straight again. Feel the muscle in your arm going fatter and shorter when you bend it.

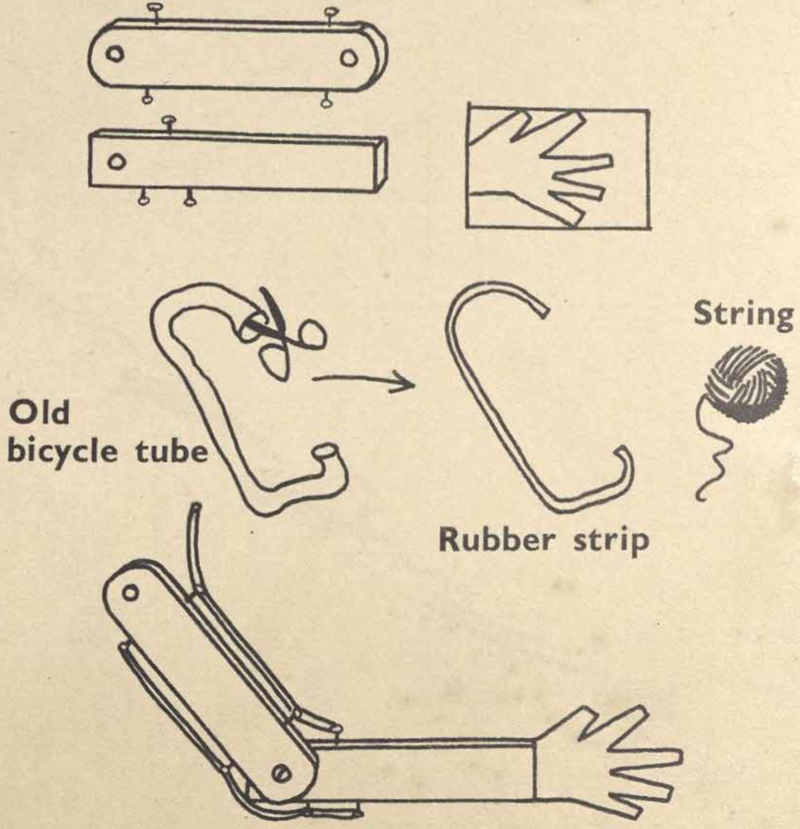
In groups make these simple models of your arm, your head and neck, your jaws, and your foot. Try and feel the muscles in all these places when you move them. Draw the way you think your leg works after feeling the muscles.

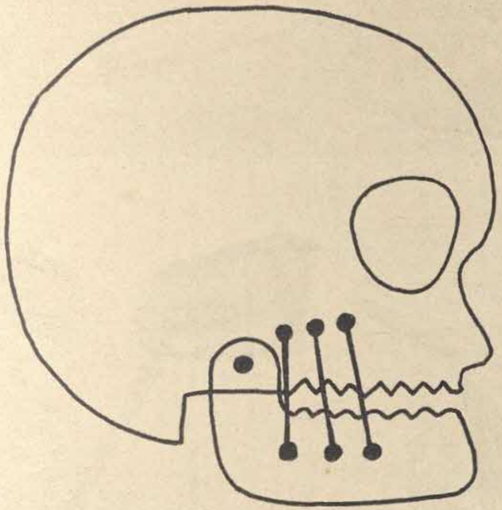


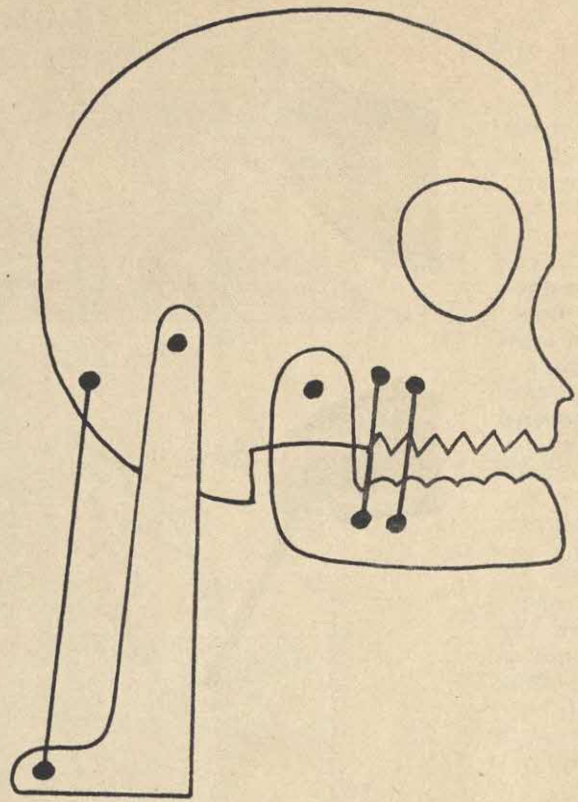
1



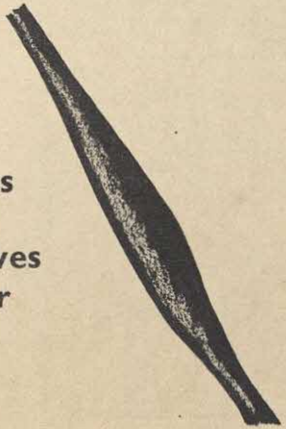
What you Need

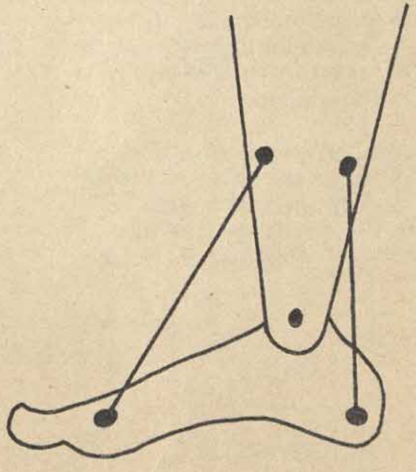






Muscles make themselves shorter





MORE ABOUT WATER

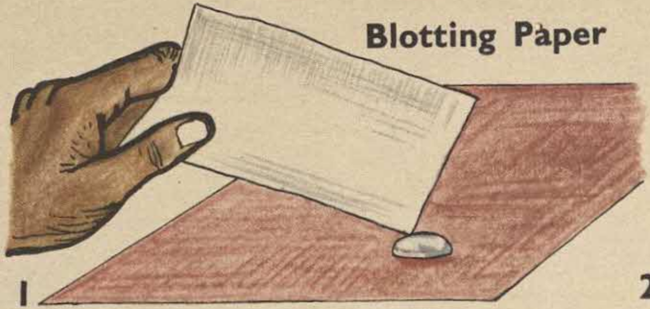
Things to do with Water

1, 2. Some things will soak up water. Do some experiments and make a list of things that will soak up water and things that will not.

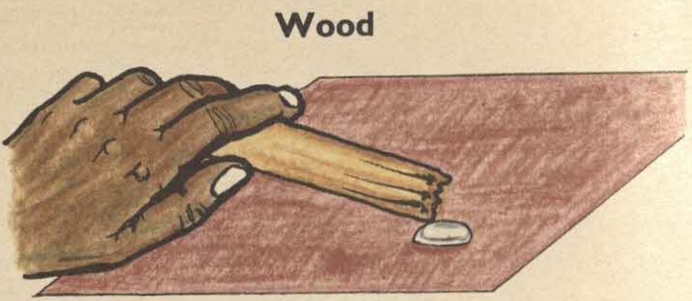
3, 4, 5. Try this and notice that, even if the salt or soap seems to have gone altogether, when you taste the water it is still there. Even if the water *looks* clear, it may not be. In a later book you will learn how to make the water pure again. **6, 7, 8.** With three other jars, try putting other things in water. Stir them very well. Write down your results.

Water contains *air*. This is why fishes, tadpoles, plants and other things can live in water. You can get the air out of water by heating it. Try experiment 9, 10. Air will come out as bubbles and collect in the little bottle. When you have collected a small bottle full of air, hold a lighted match or splinter of wood in it, and you should find that it burns.

Boil some water, put it in a bottle with a cork. Put fishes, water snails or tadpoles in it. Try the same with unboiled water and no stopper. What happens and why? Write down your answers.



1



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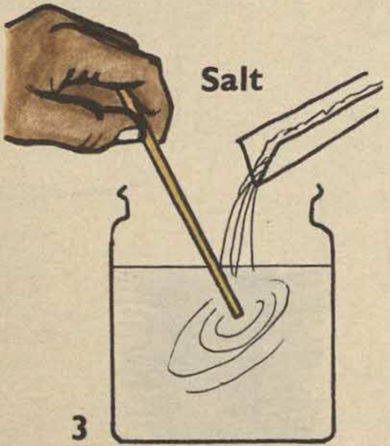

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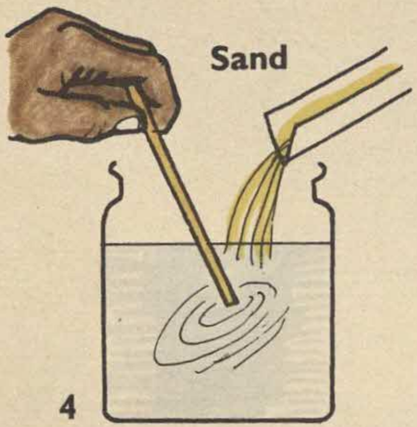

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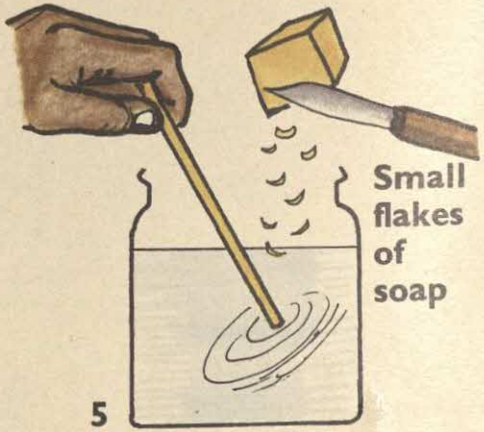

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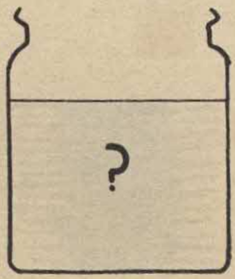

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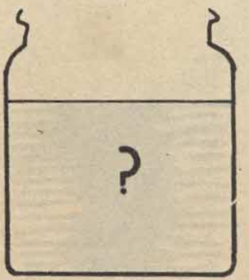

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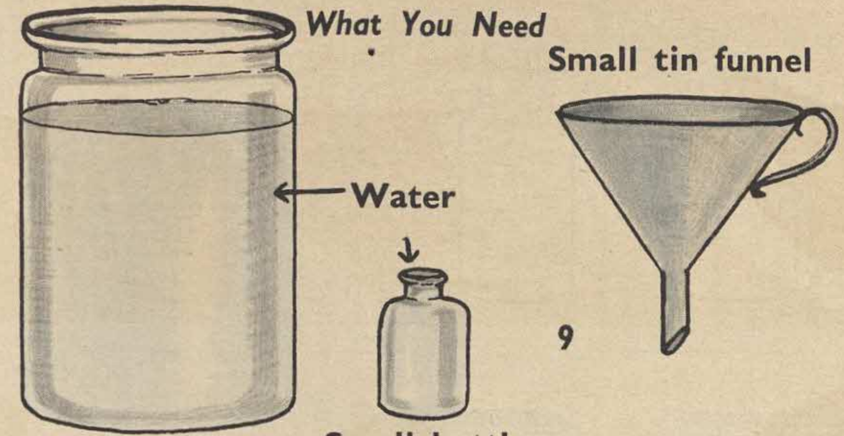
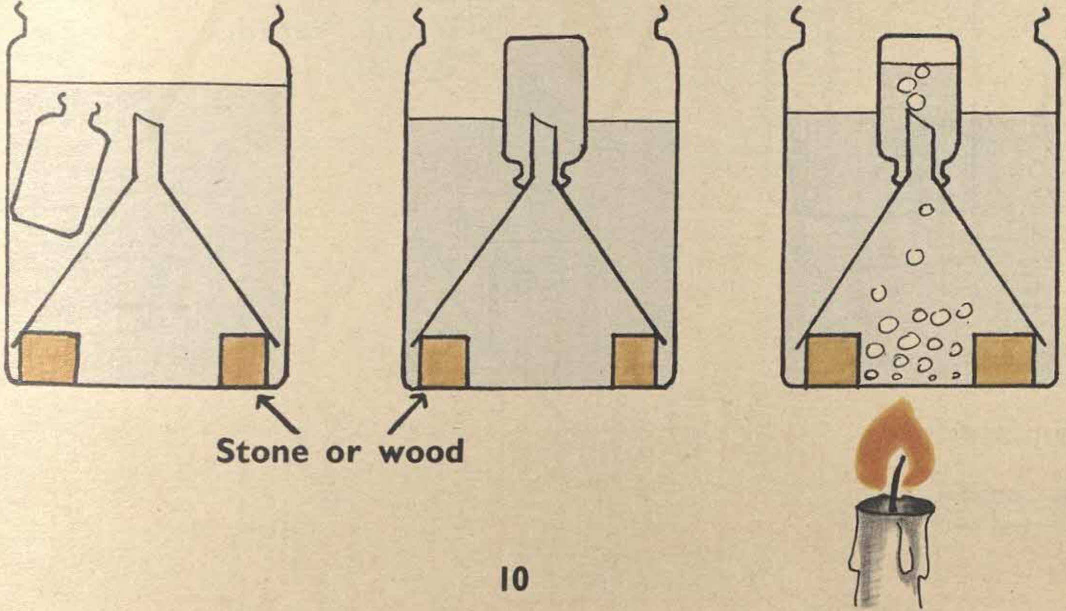
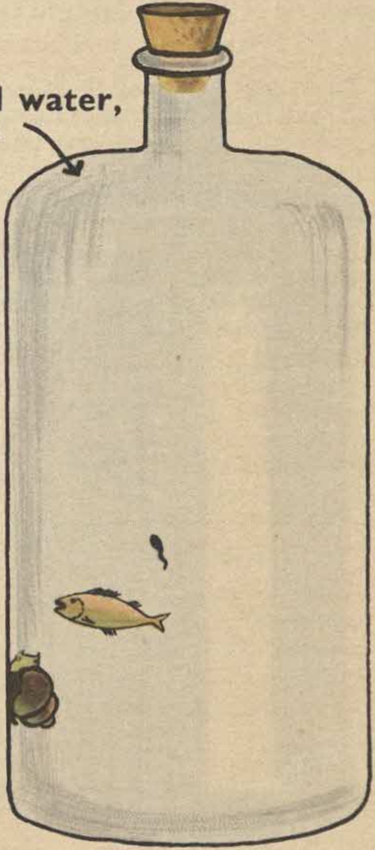

What You Need
Small tin funnel
Water
Large jar or can
Small bottle

9


Stone or wood

10


Cork or stopper
Boiled water, no air
Small fish or Water Snails or Tadpole

11

MORE ABOUT WATER

Water and Plants

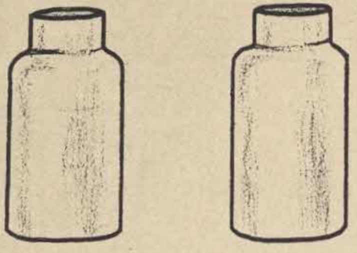
Make sure that you have everything you need, **and that the two small plants are as alike as possible. Then remove the leaves of one of them. The oil on the water stops any water getting out except through the plant.**

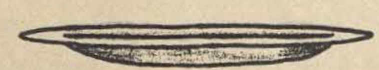
In 4, 5, 6, the vaseline or grease stops air or water getting in or out of the big jar.

Some groups of children could do 1, 2, 3, and others 4, 5, 6, but you should all see one another's experiments.

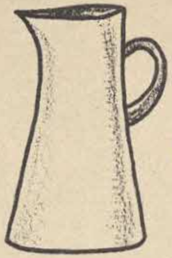
What part of the plant do you think takes up the water?

Does the plant keep all the water? Through what part of the plant does the water leave the plant?

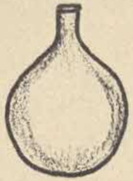




Large plates

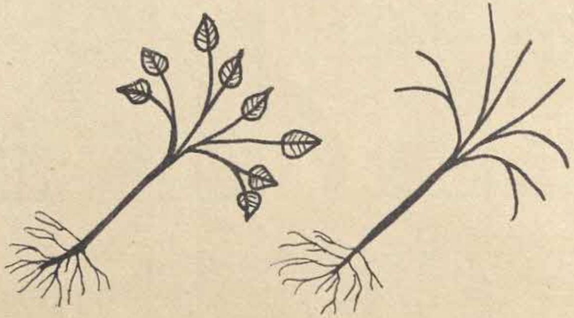


Water

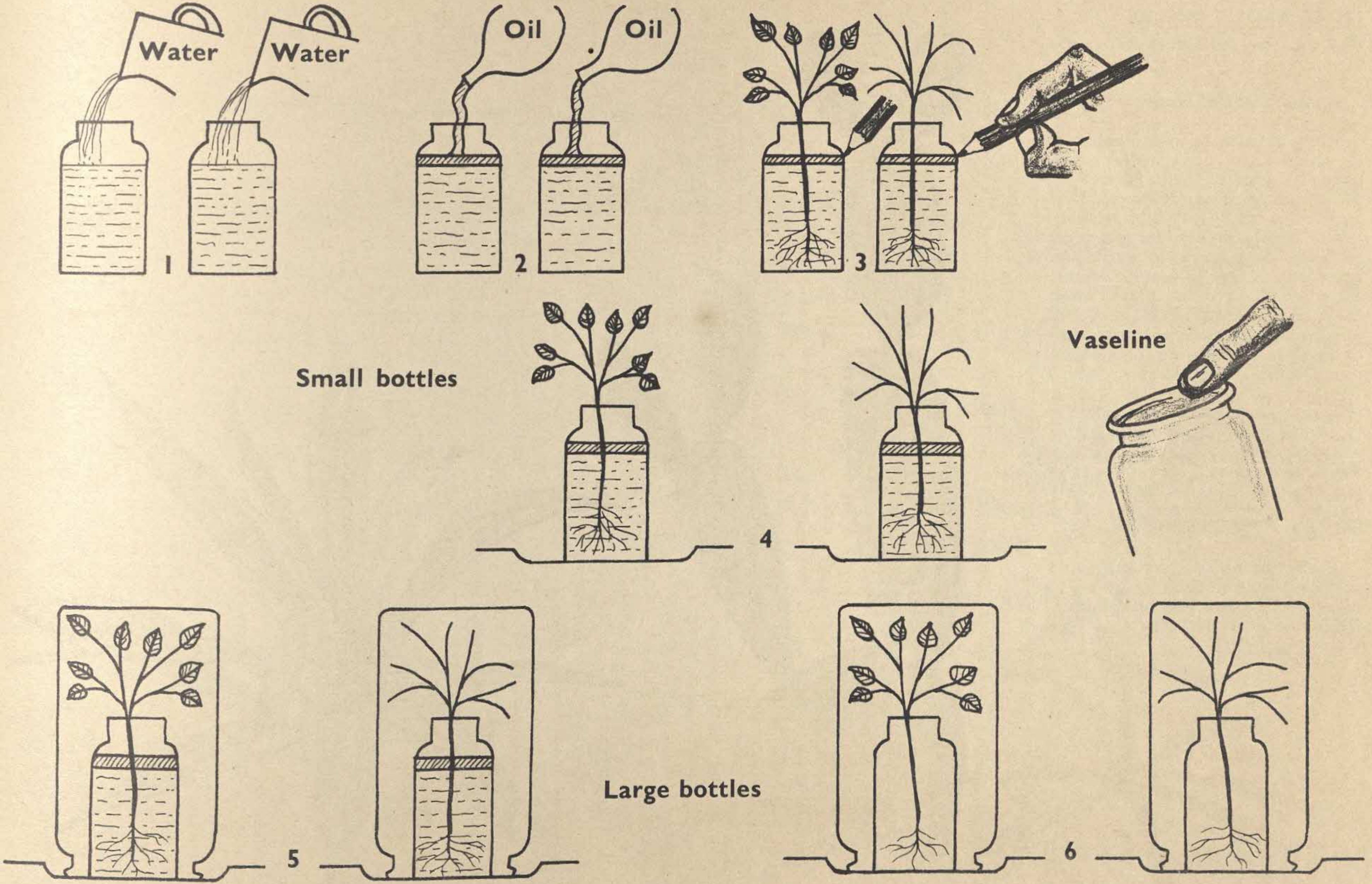


Any oil (Palm, Olive or Engine oil)

Vaseline



What You Need


Water
Water
Oil
Oil
1
2
3
Small bottles
4
Vaseline
Large bottles
5
6

MORE ABOUT WATER

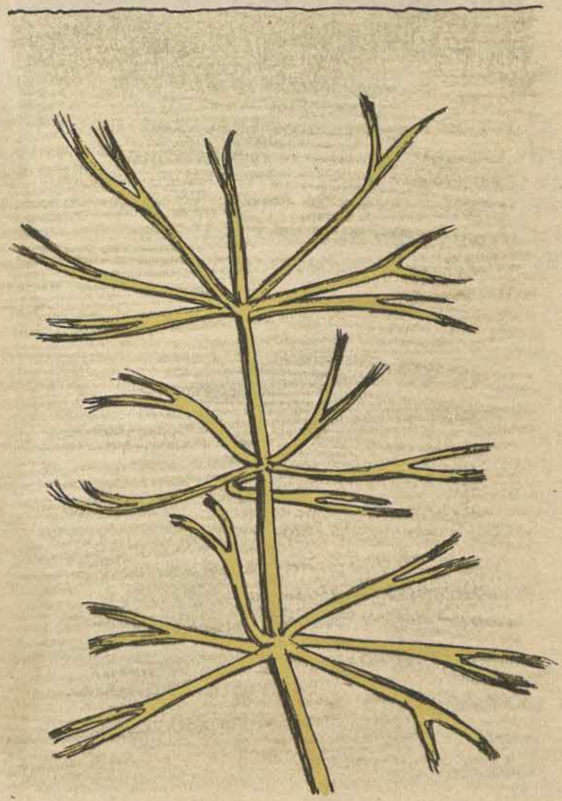
Too much and too little water

Special kinds of leaves.

During the week before this lesson, hunt for strange kinds of leaves. **Remember where you found them. Here are some strange kinds of leaves. The spikes are really leaves of prickly pear. The water lily leaves are made to float. Some leaves of water plants are made to live in rushing water. Plants that live in dry places often have special kinds of leaves. Some have leaves to store water and have a shiny skin that will not let the water out. Others have thin spiky leaves.**

Arrange the leaves you have collected on the Nature Table. Draw some of them, *not* those on this page. Try and say what you think has made any of them different from ordinary leaves. Your teacher will of course help you.

Always be on the look-out for strange leaves in future, and try to remember where you saw them. Draw and enter them in your Nature Diary.



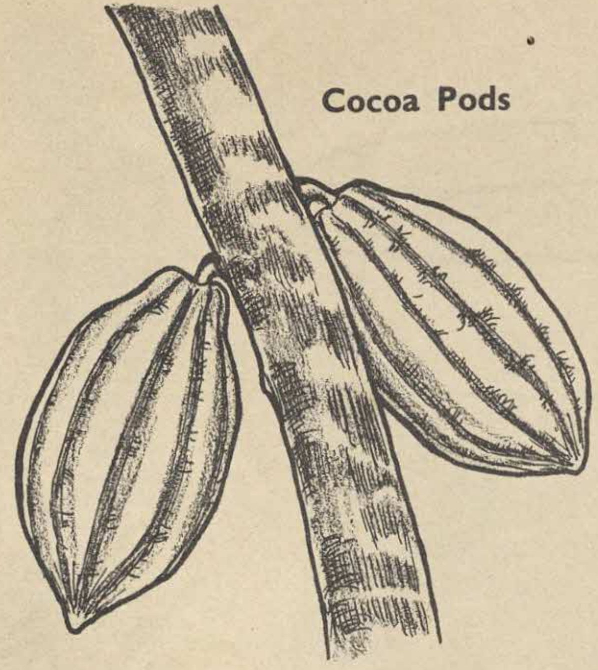
THE PLANT TAKES CARE OF ITS SEEDS

Berries and Fruits

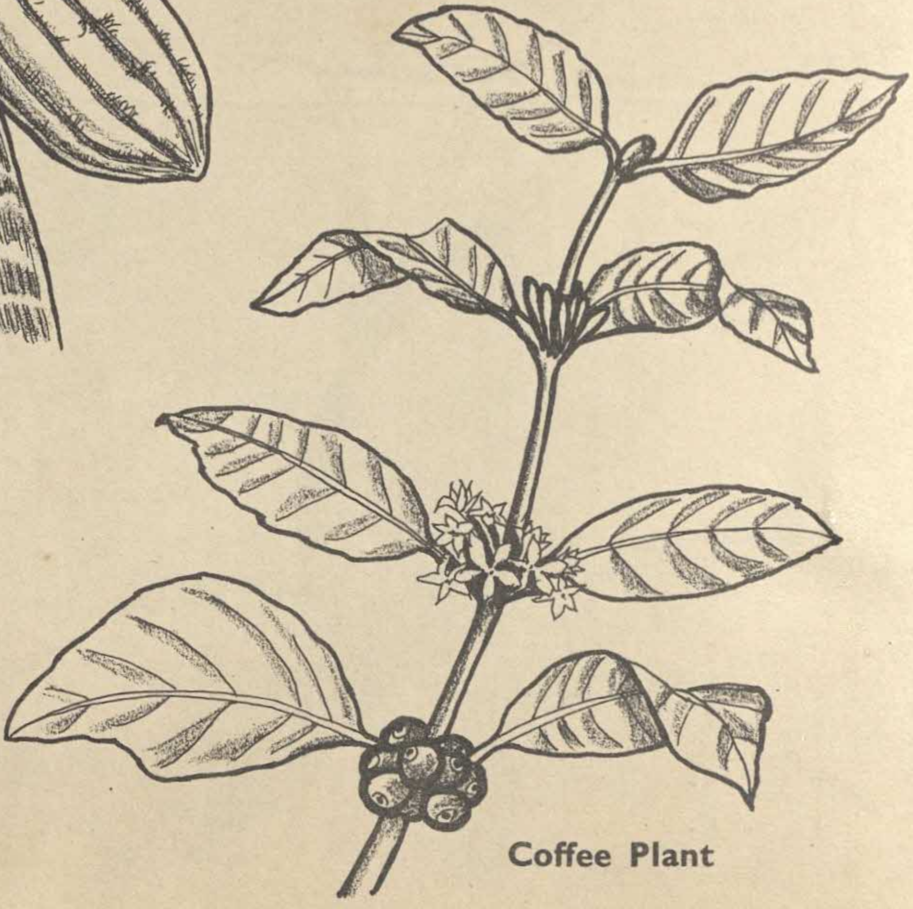
In Book I, we saw how some parts of the flower change into the 'Seed box'. Some grow large, soft and round, like the orange. Some dry up and become hard.

Collect a number of 'soft' seed boxes like mango, okro, tomato, etc. Draw the way the seeds are arranged in them. Write down a list of those which have only one seed and another list of those which have many.

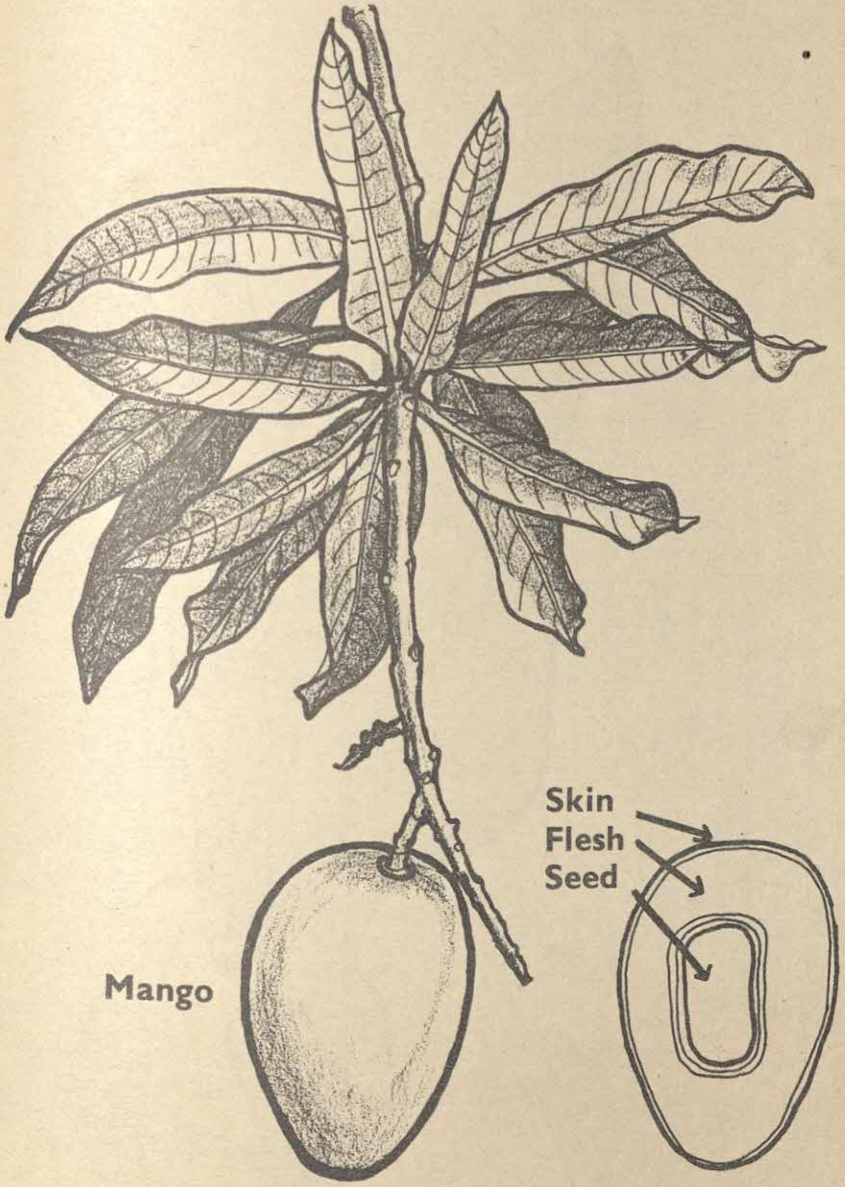
By turning into something which birds and animals like to eat, the seed boxes get themselves carried away from the parent plant. Although they pass through the body of an animal, this usually does no harm to the seeds.



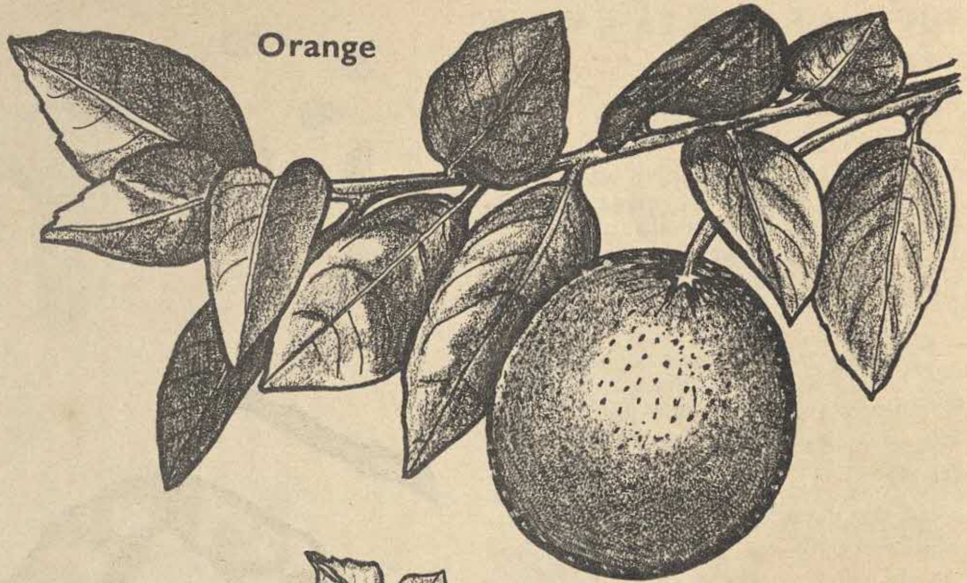
Cocoa Pods



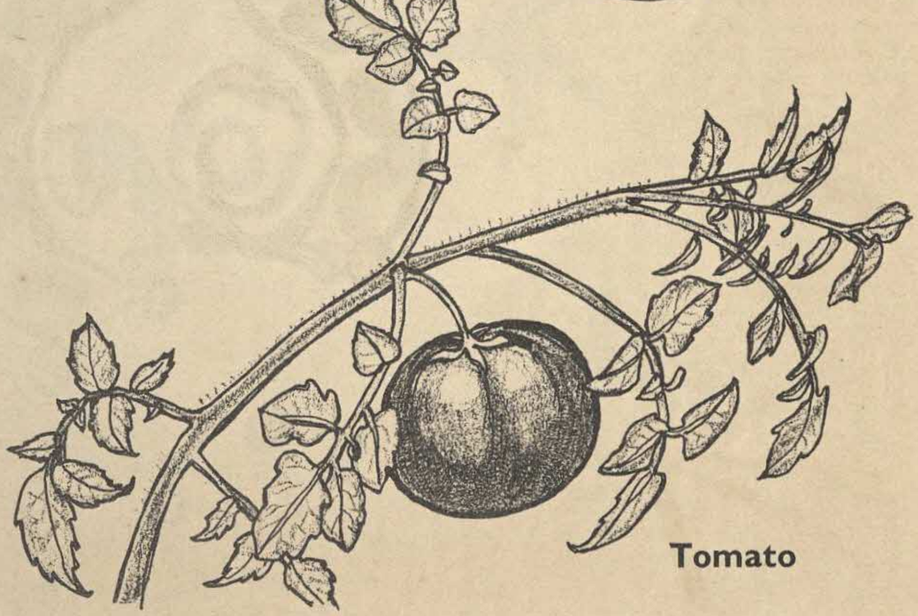
Coffee Plant



Mango



Orange



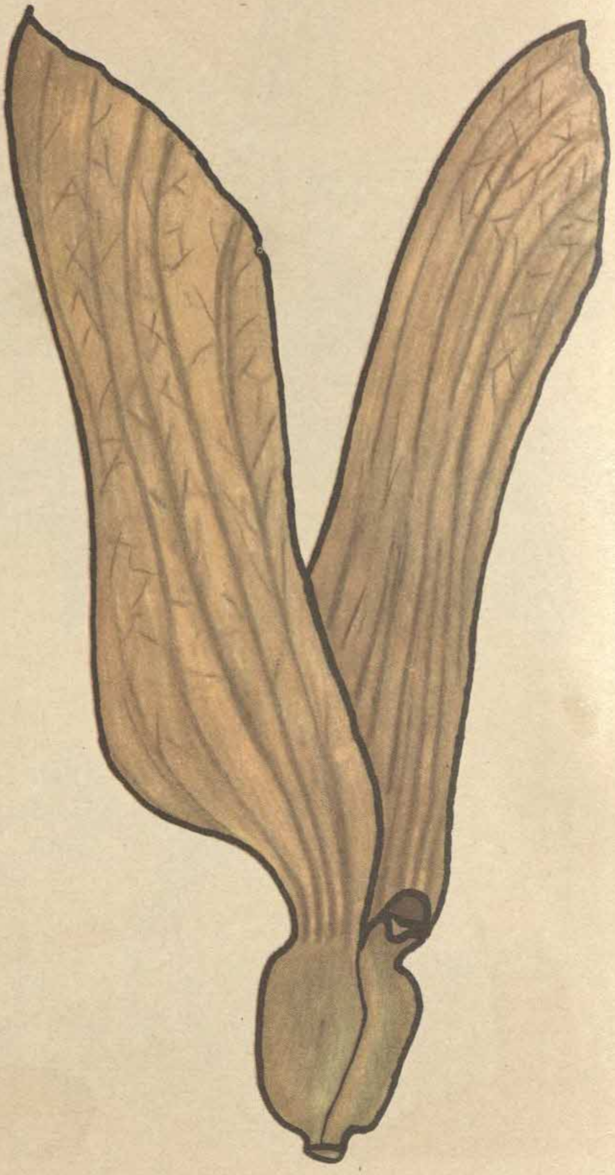
Tomato

THE PLANT TAKES CARE OF ITS SEEDS

Scattering Seeds

The dry seed boxes have ways of throwing the seeds out, or getting the wind or water or animals to carry them about, so that the new plants will grow somewhere away from the parent plant.

Collect as many seed boxes as you can, before this lesson. **Now draw them and write down next to the drawing how you think each kind of seed will be scattered about. Why do you think that they need to be carried away from the parent plant? Write down your answer.**



LOOK AT THE LAND

Water and Soil

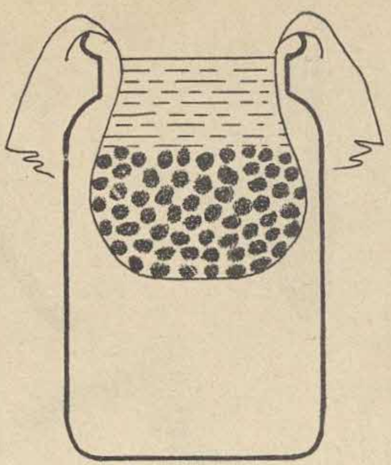
This is to find out how water passes through different kinds of soil.

Do this experiment in groups and then write down what you have found out.

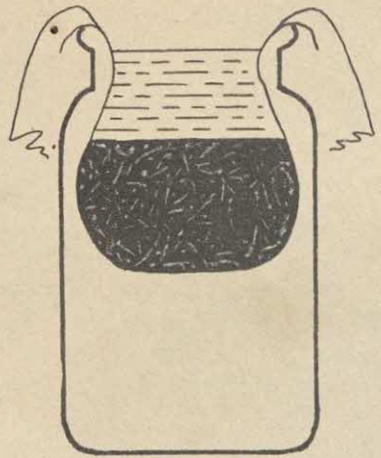
The 'cut-in-half' picture shows how, when the roots have to go deep, tall trees grow best. But when the roots can spread out to get water and good food from the soil near the top, broad trees grow best.

Look at the trees near the school. Which do you think have long roots? Which have spreading roots?

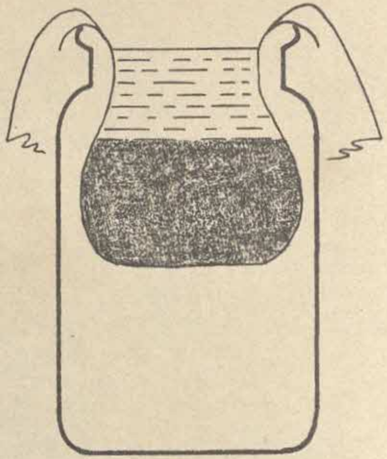
What kind of soil are they growing in? Talk to your teachers about this when you go out to look at the trees.



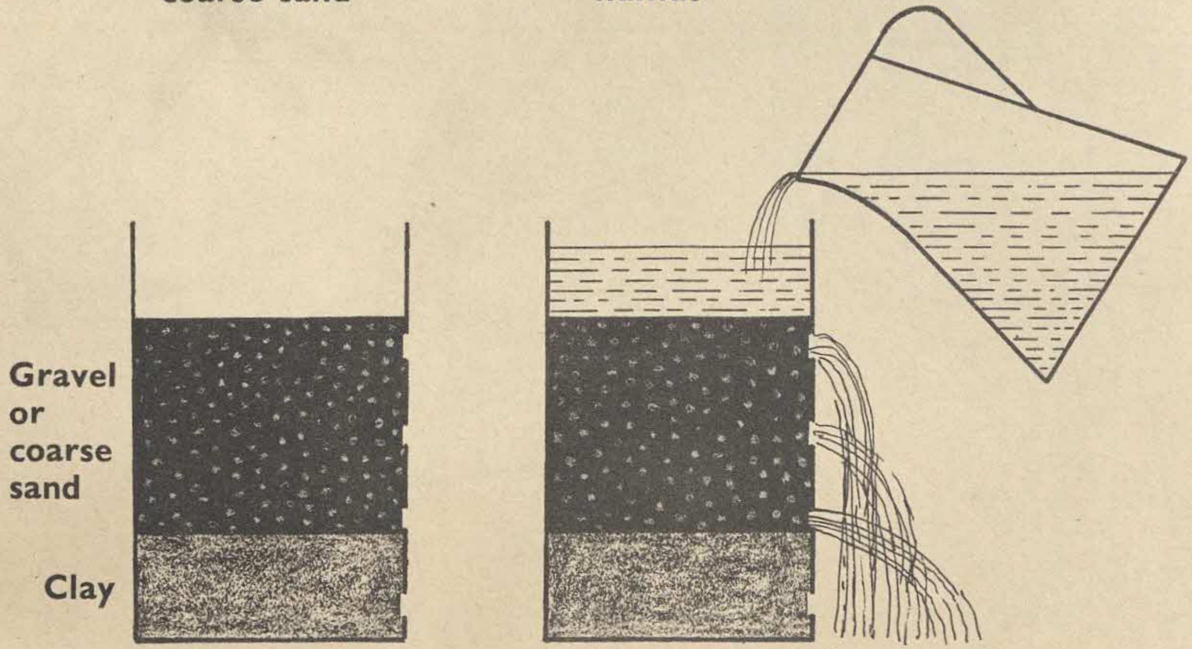
Gravel or coarse sand

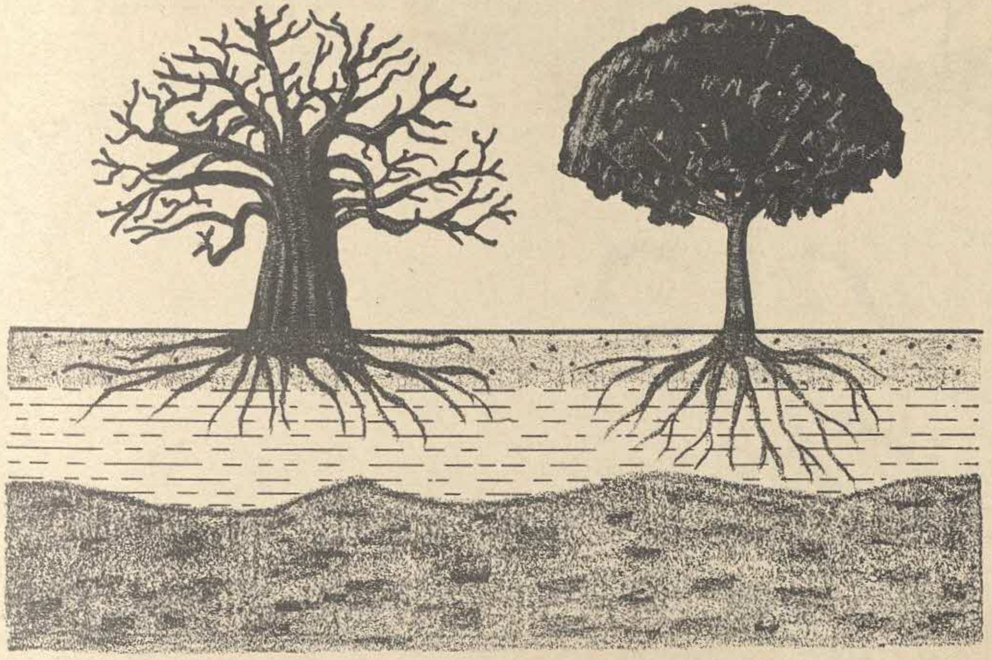


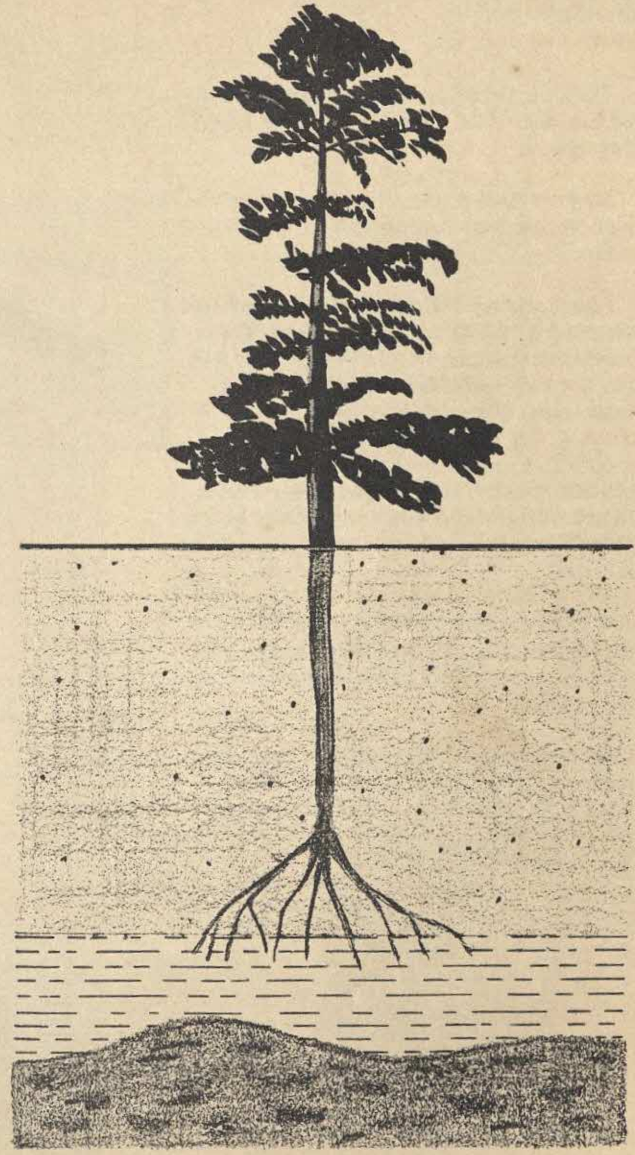
Soil with humus



Clay







LOOK AT THE LAND

More about Soil

This picture has been drawn from where the side of the road has been dug away.

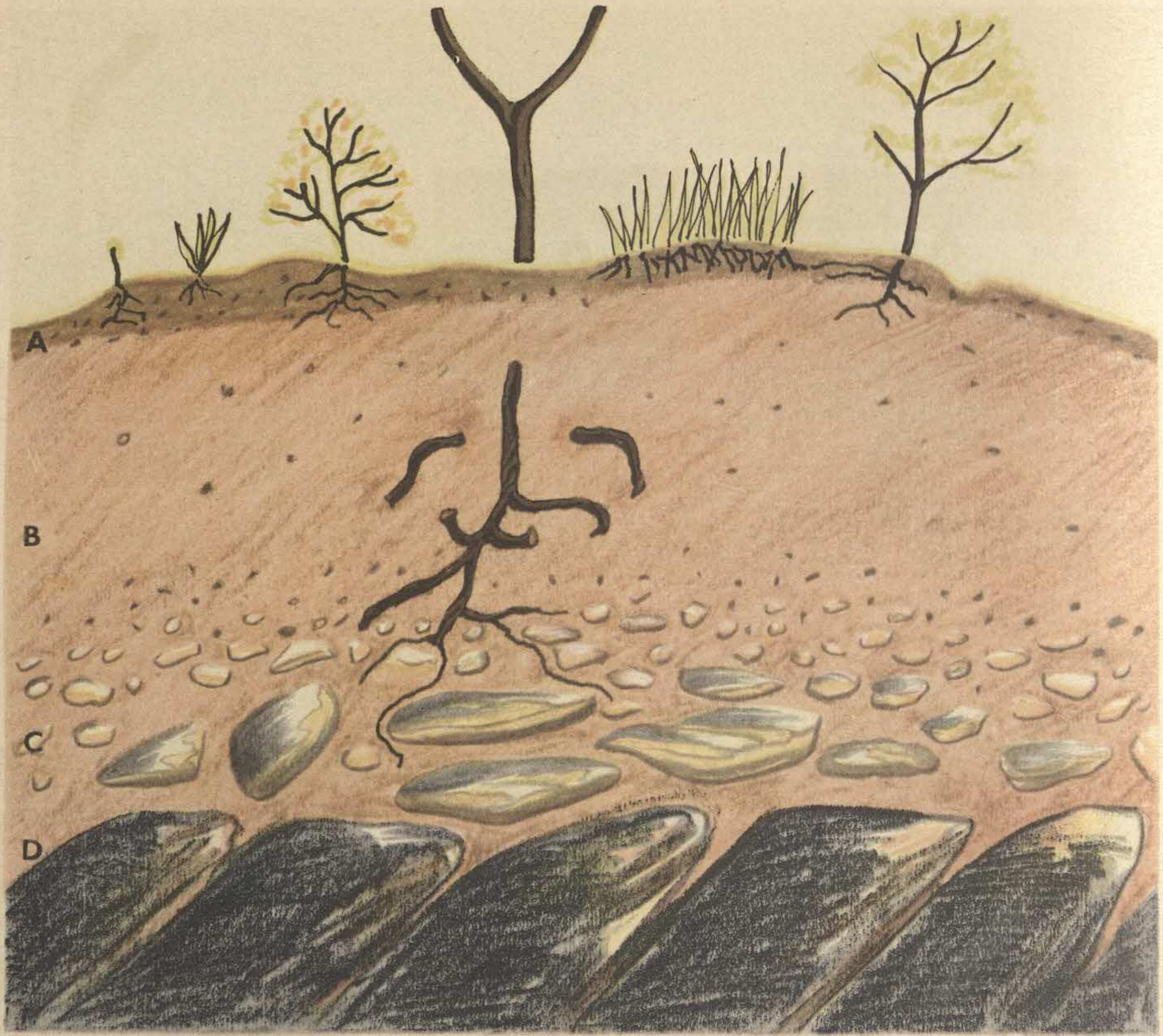
Try to find a place like this *and then your teacher may be able to take all the others to see it too.*

Look for the different kinds of soil like A, B, C, D in the picture. Collect some of the best soil. When you get back to the classroom answer the following questions:

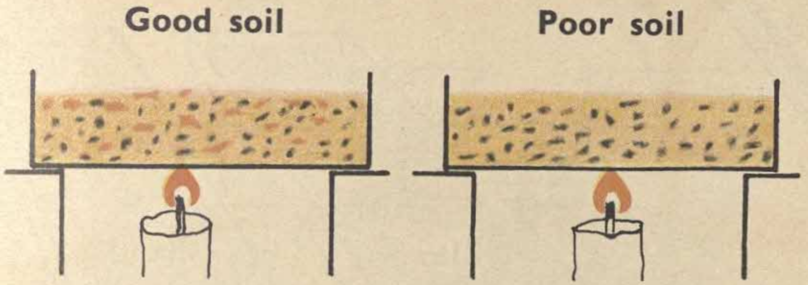
What kind of soil did you find the plants most liked to get their roots into? Where did the long roots go to? What happens when a root comes to a stone?

Experiments 1 and 2 show ways of finding out if soil has any 'plant remains' in it. This always makes the soil rich.

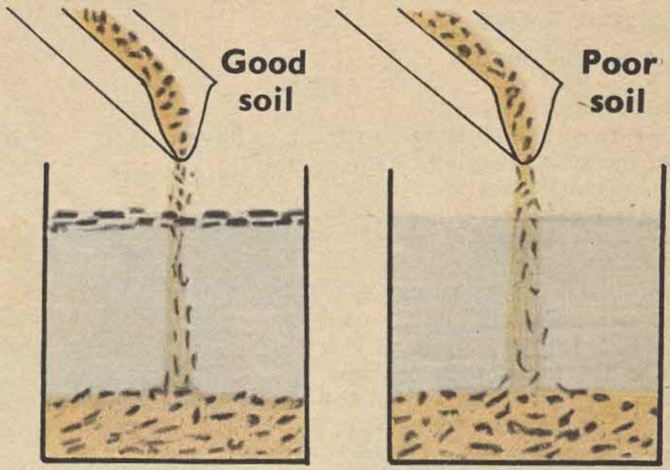
Experiment 3 shows how you can make a sample of good soil. Try all these. Write down what happens.



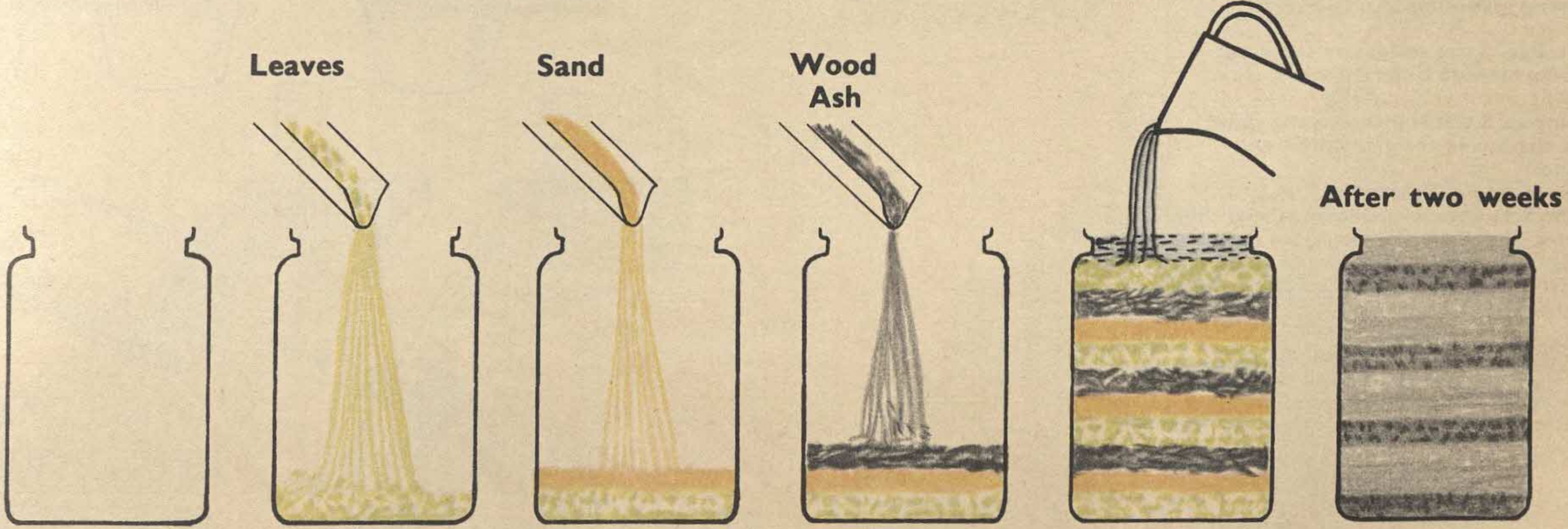
1


Good soil
Poor soil

2


Good soil
Poor soil

3


Leaves
Sand
Wood Ash
After two weeks

LOOK AT THE LAND

More about Soil and Water

These are two shallow boxes, with one end of mosquito netting. Paint them well on the inside.

Have them ready for the first lesson.

All these experiments are to tell you about water and soil.

You make the 'rain' with the tins with holes. The rain must fall on the two boxes in exactly the same way. Try out each experiment with the two boxes side by side.

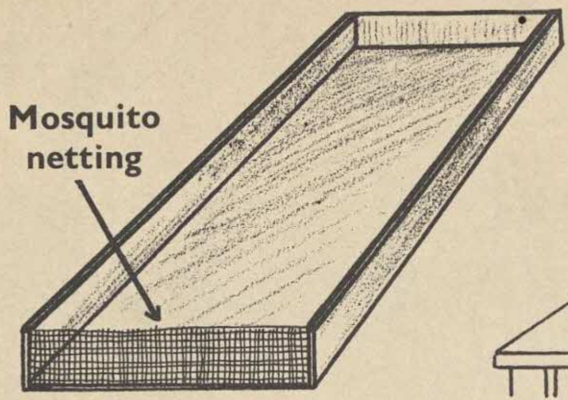
The boxes must be tilted to be like sloping ground.

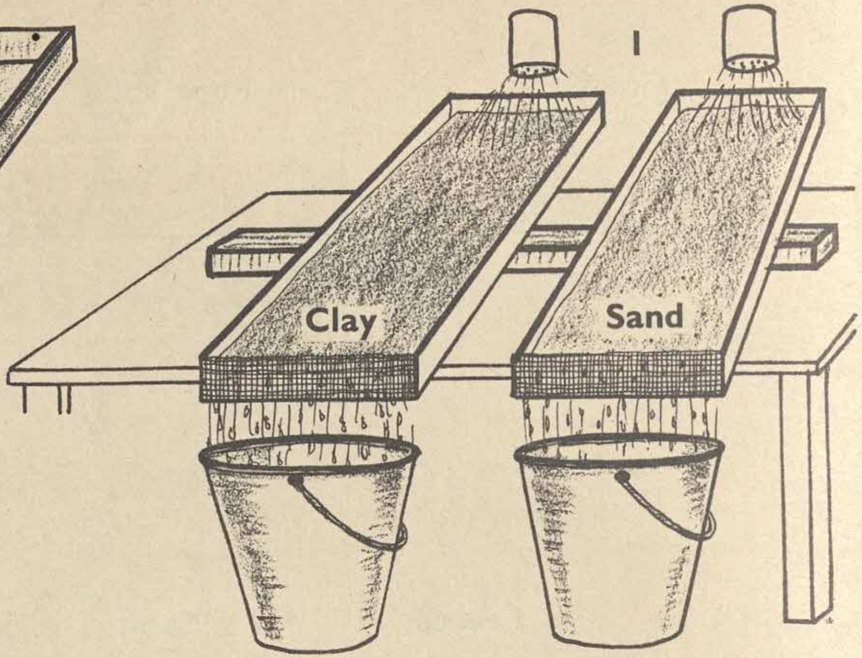
In Exp. 3 the soil is the same but the furrows go different ways.

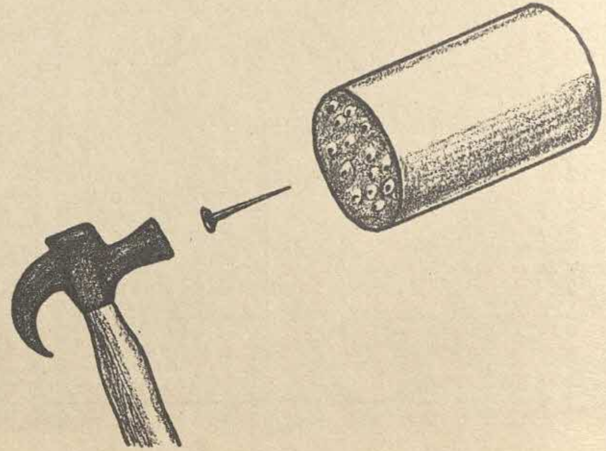
In Exp. 5 the soil is also the same but the boxes are given different slopes.

In every case write down where the water goes. In which box does it stay longest? How much sinks to the bottom and how much runs along the top of the soil?

(Other experiments besides these, like putting a layer of sand on top of a layer of clay, *can be invented by your teacher.)*







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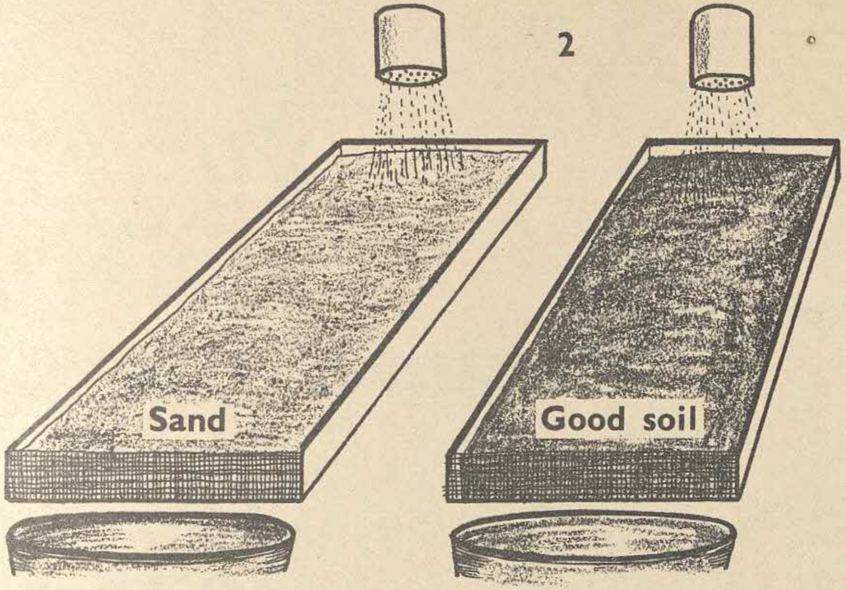
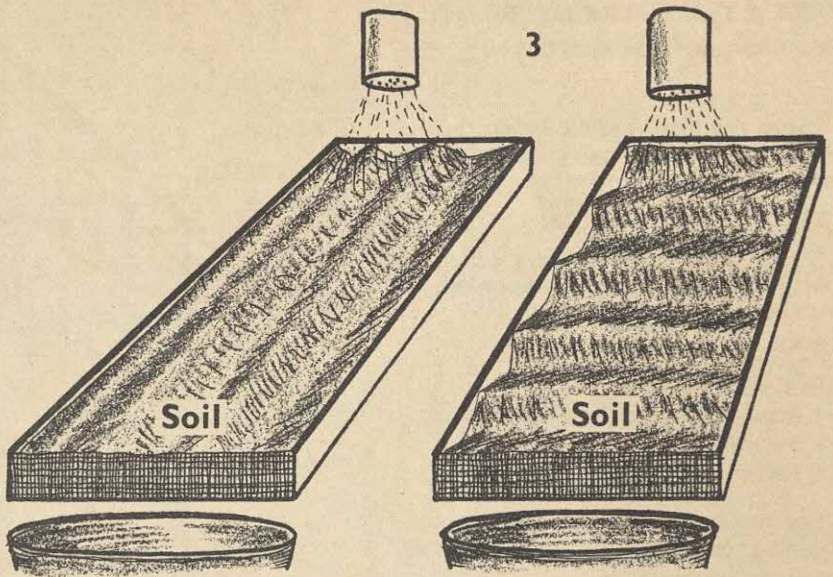
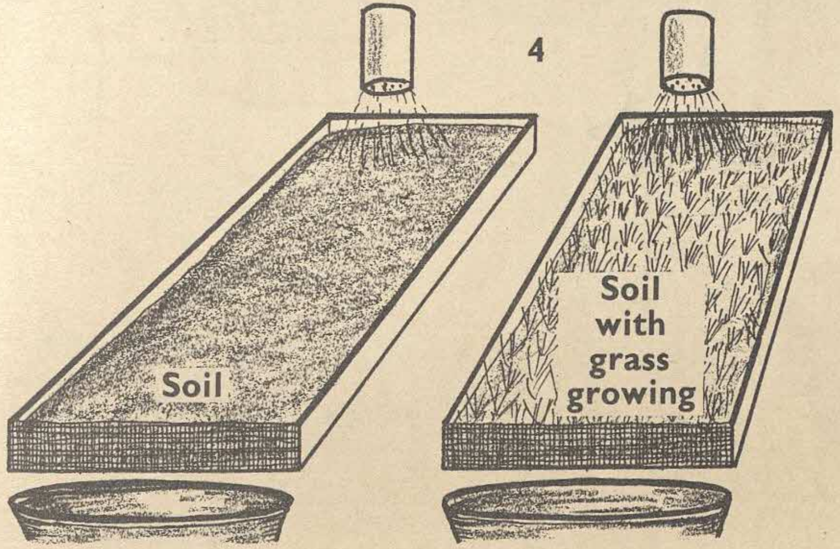

Sand
Good soil

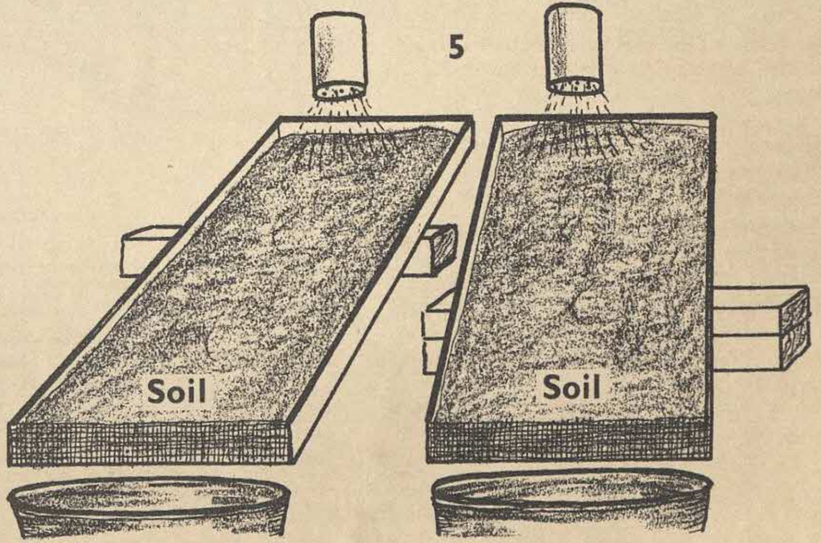
3


Soil
Soil

4


Soil
Soil with grass growing

5

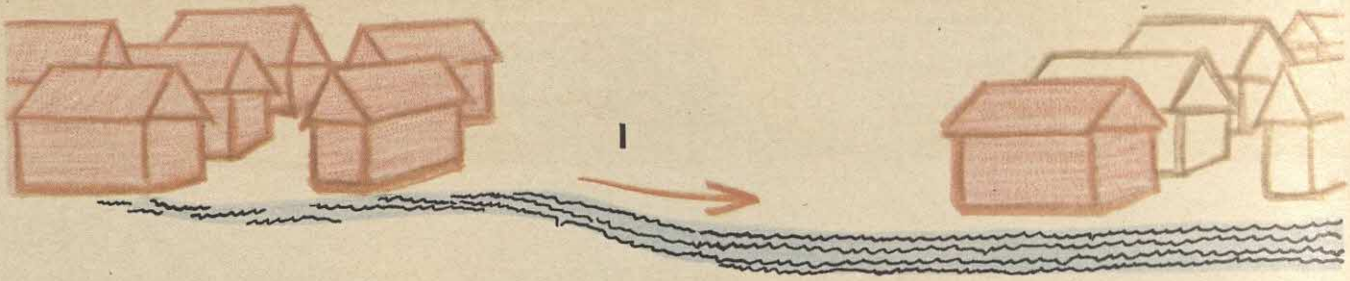

Soil
Soil

TAKE CARE OF YOUR BODY

How Sickness Can Come to You

Here are six ways in which the 'seeds of sickness' can pass from one place to another and from one person to the next.

Write down all the ways which you can think of to stop it happening.



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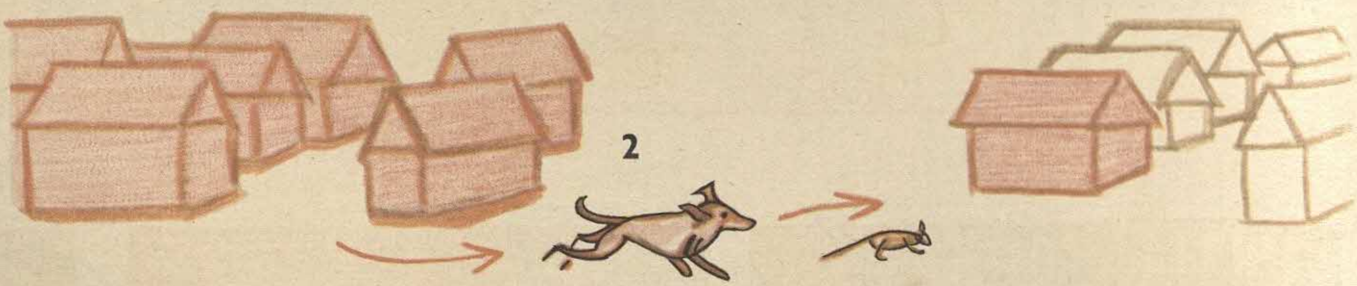

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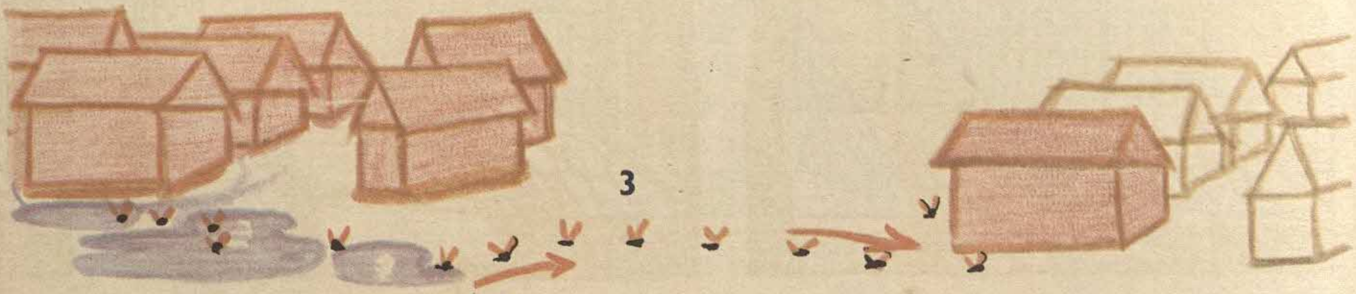

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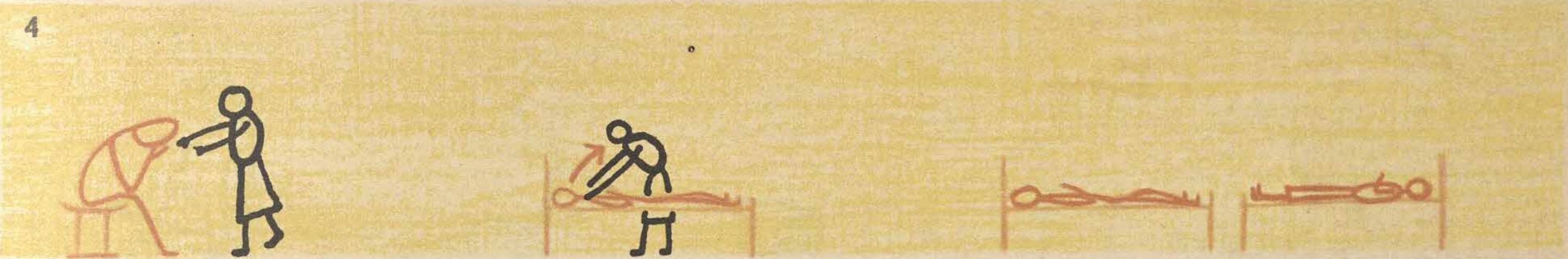

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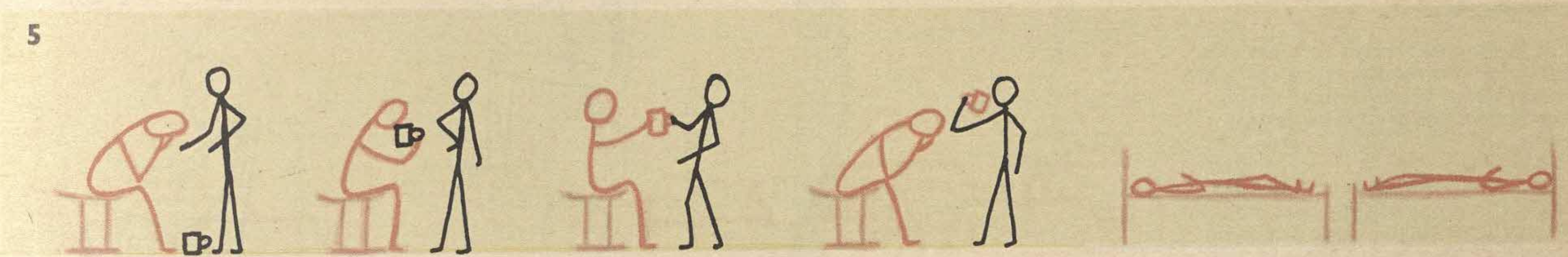

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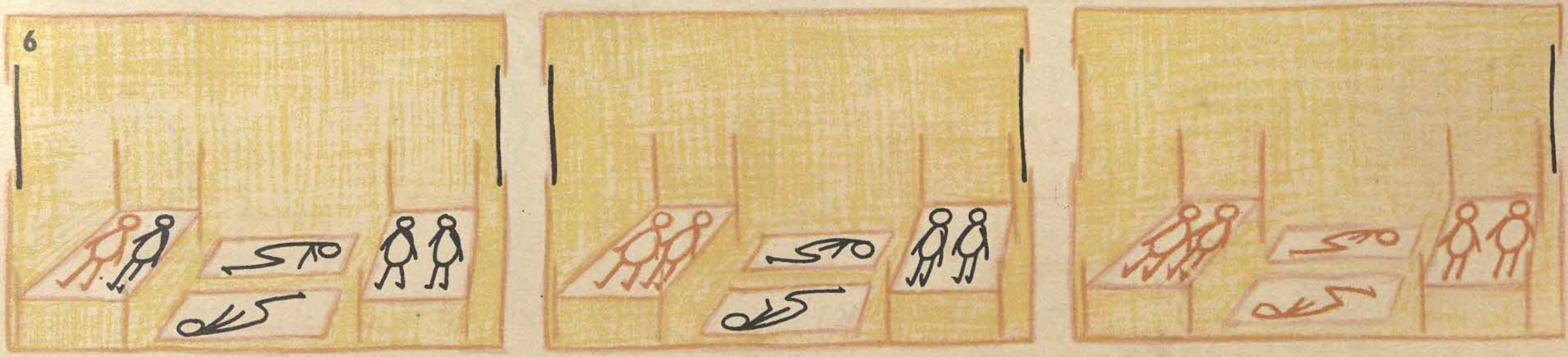


TAKING CARE OF YOUR BODY

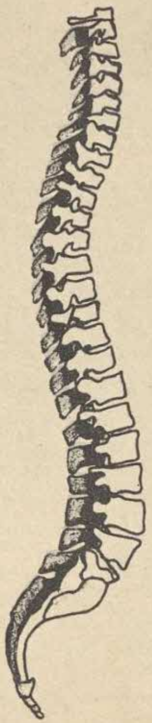
Sitting and Standing

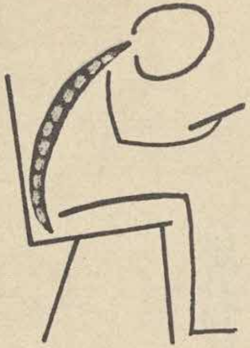
The most important part of the frame which holds your body together is the backbone. Really it is made of many bones with a part of the brain running through it. Look at the backbones of some of the small animal skeletons you have collected. You will see the hole through the middle of of each part of the backbone through which the long nerve or cord from the brain passes.

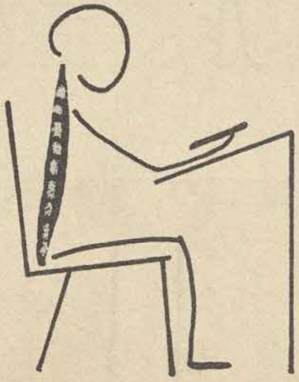
It is very important to treat this part of you carefully. Here are some things which bend it out of shape. Loads that are too heavy. Sitting badly.

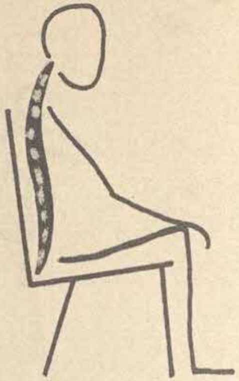
Feel the bones of your own backbone. Draw one of the bones from an animal's backbone. Here are some ways that help you to grow fit and strong.

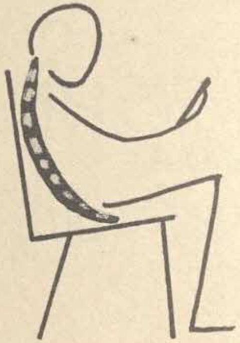
Write down the numbers of the pictures which you think show that the backbone will be gradually bent into a bad shape. Watch yourself and other people and see you practise keeping your back strong and able to bend easily in all directions. Never keep it for long in a bad shape.

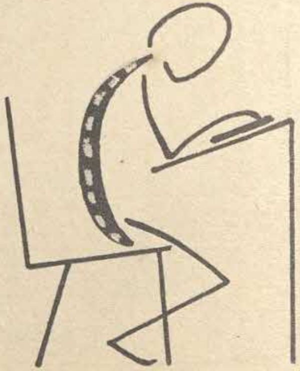


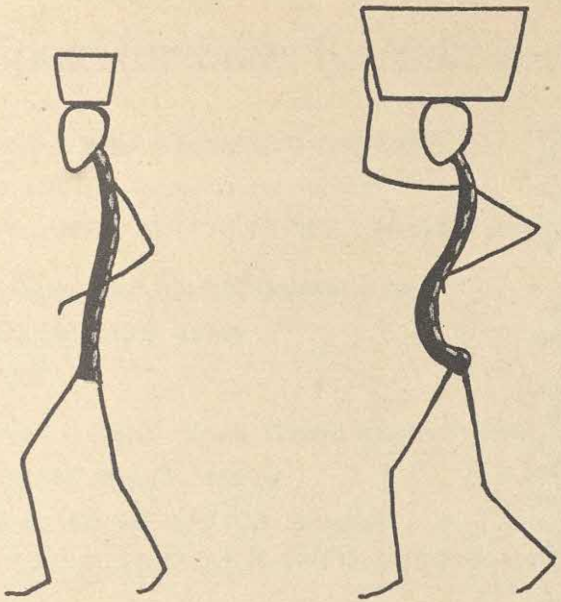


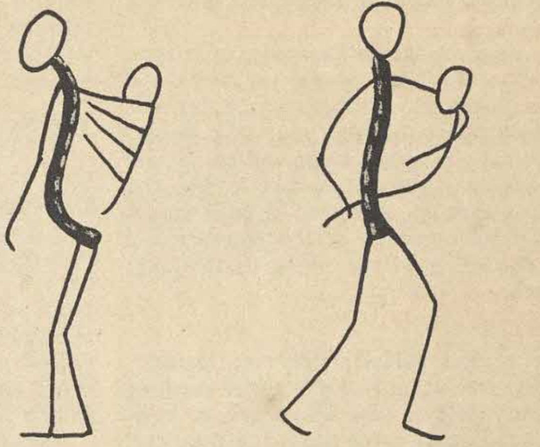


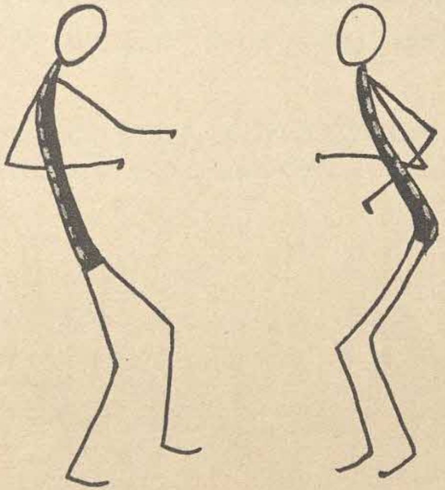


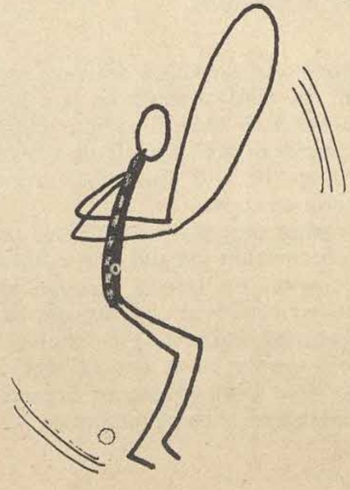


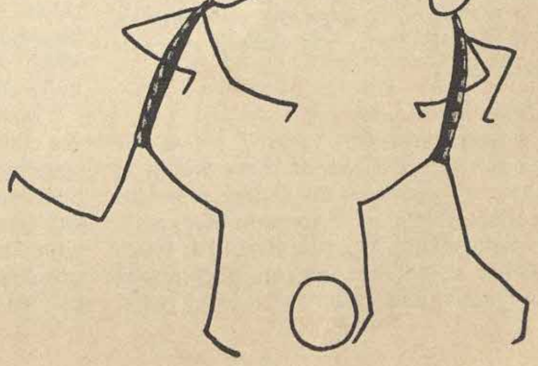












Notes to Teachers

This is a pupil's book, but the work demands considerable forethought, preparation and guidance by the teacher.

You do not need any special knowledge of science. All you have to do is to try out the work and experiments yourself well before the lessons. You will enjoy doing this and your own understanding of what you are teaching will be helped. This done, you may look forward to leading the children easily through each step of understanding. You will be surprised at the pleasure and confidence you will get from trying these things out in private.

Syllabus

The books are not divided rigidly into 'lessons'. One page may well occupy two or three teaching periods. That is left to you. The work *is*, however, grouped. Two or three pages at a time deal with the same topic. You should finish each topic before going on to something new. But there is no need to do the topics in the order given in this book. You may find it more convenient to deal with them in a very different order, depending on the season of the year and what you are able to get as material for your lessons. Plan the order of your groups at the beginning of the term, or even the year, but be prepared to change this at any time if there is a good reason for it.

Practical Work

Try every experiment first yourself before the lesson. Look at the work two or three weeks in advance, because sometimes the children have to bring or collect things, and sometimes experiments in growing things must be started as much as three weeks ahead. The biggest problem at first will be getting the children to bring what you want in sufficient quantity and at the right time. It will pay to concentrate on getting them to do this in the early stages. As for yourself, you will find that whatever demands practical preparation beforehand is printed in *light lettering*.

Written Work

If possible the children should have one exercise book for Nature Study, Gardening and Hygiene together.

It is important that children should keep their own records of living things they see. (Book One, page 4.) When other work is completed by a pupil in these or other lessons, he should be allowed to spend a few minutes in writing up his records. If this is not possible during the day, a short time during some Nature Study periods should be specially allotted to it.

Sometimes this book asks children to supply written answers to questions. *After* they have done this, you must go over the answers with the whole class, and also see that each pupil corrects any mistakes he has made.

Drawings

Even a crude and unskilled drawing made by a pupil from his own observation is a hundred times more valuable than a careful copy of a blackboard sketch or a diagram from a textbook. With your help, he will improve in time, but *never* allow him to copy.

You will realise that this course tries to train the child in observation and give him a *real* understanding of the subject largely through his own practical and written work. Although, as in all subjects, correcting and testing must play a part, your task will mainly be to ensure that proper preparations have been made, to organise and to give guidance and encouragement.

Helpful Books for both Teachers and Pupils

From *African Welfare Series* Oxford University Press
WATER AND LAND Clements and Topham
THE AFRICAN AND HIS LIVE STOCK Thornton and Leckie

From *Science at Work Series* Oxford University Press
INSECTS AND DISEASE Edney
WEATHER Ellis

From *Simple Science in Simple English* Oxford University Press
ANTS AND THEIR WAYS McKay
BEASTS AND BIRDS OF AFRICA Longden
SOME TROPICAL PLANTS AND THEIR USES Irvine

A FIRST TROPICAL NATURE STUDY Deakin, Longmans
ANIMALS OF WEST AFRICA Cansdale, Longmans
THE OUTDOOR WORLD (Series of six) Skaife, Longmans

For Teachers
THE TEACHING OF SCIENCE IN TROPICAL
PRIMARY SCHOOLS E. D. Joseph, Oxford University Press

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